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The statics and dynamics of metal railway and road bridges [1],

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Figs. 0 to 14, pp. 1006 to 1024.

§ 1. — General.

1. With the exception of plate-web girders, only used for small spans, the main girders of bridges, whether with parallel flanges or not, may be divided into two main classes :

Trusses with diagonals;
Trusses without diagonals.

The main and essential difference is that in the case of girders *without diagonals*, the static calculation can be completed and be exact; nothing remains unknown and experiments when made always give stresses lower than those indicated by the calculations, so the safety factor is always greater than that provided for; whereas in the case of trusses *with diagonals*, the statical calculations are always incomplete and in fact very inexact as the rigidity of the joints is not taken into account : consequently when the bridge is tested experimentally, the stresses are always higher than those given by the calculations so that the safety factor is less than that fixed upon, and less in a proportion that cannot be determined and which sometimes is large [2].

2. In the statical calculations the dynamic stressing of the bridges is taken into account by multiplying the static

(1) Translated from the French.

(2) See the paper by Professor KEELHOFF, of the University of Ghent, entitled *Rapport sur les ponts Vierendeel (Report on the Vierendeel bridges)*, presented at the International Metal Construction Congress held at Liége, in 1930, on the *two kinds of girders with and without diagonal braces.*

load by a given coefficient which is nominated the *dynamic coefficient or coefficient of impact.*

The determination of this *impact* figure is the great preoccupation of permanent way engineers today.

This determination has been the object of numerous theoretical and also experimental investigations and neither the one nor the other has given any serious results.

The experiments have not confirmed the coefficients obtained theoretically, in fact far from it; and here we are considering theories of the most elaborated mathematics such as that of Professor Timoshenko. In addition the problem is so complicated that even the results of the experiments do not in any way agree with one another, and the coefficients of impact differ very widely from one country to another (see No. 21 below).

* * *

Theory has none the less its value as it gives qualitative results which practice confirms and which it is important to know; this is the reason why we give later on some theoretical calculations which bring out the principal factors influencing the value of the dynamic coefficient.

The question of the dynamic coefficient is especially important for trusses, as in these the actual static stresses are already greater than those found by calculation and in addition there are the dynamic stresses, the effect of which is especially serious at the joints where all the angles are acute.

In the case of girders without diagonals however, to begin with, the actual stresses are lower than those given by the calculations and in addition all the joints have rounded-off angles, the best arrangement for resisting shocks, vibrations and the various dynamic effects.

§ 2. — **Vertical centrifugal forces.**

3. Let us take a girder of constant moment I and section : a girder supported at both ends and with its horizontal axis straight, i. e. without counter camber.

Let q be the uniform loading per linear unit of an undefined train running over the bridge at a constant speed v, the span being l.

If the load, when stationary, covers the whole bridge, the differential equation of deflection is :

$$\frac{d^2y}{dx^2} = \frac{1}{2\mathrm{EI}}\,q\left(lx - x^2\right) = \frac{1}{\rho}.$$

The maximum value of $\frac{1}{\rho}$ is :

$$\frac{1}{\rho} = \frac{1}{8\mathrm{EI}}\,ql^2. \quad . \quad . \quad . \quad (1)$$

This result is slightly increased under the centrifugal effect; wo do not take it into account and allow that the centrifugal force developed by the train crossing the bridge is at each point equal to :

$$d\,.\,\frac{\mathrm{M}v^2}{r} = \frac{qdxv^2}{g} \times \frac{1}{\rho} = \frac{qv^2}{g} \times$$
$$\times \frac{1}{2\mathrm{EI}}\,q\left(lx - x^2\right)dx.$$

The *total* is :

$$\frac{q^2v^2}{2g\mathrm{EI}} \times 2\int_0^{\frac{l}{2}}\left(lx - x^2\right)dx = \frac{q^2v^2l^3}{12g\mathrm{EI}} \quad (2)$$

We will admit the vertical resultant as being equal to this total; it differs from it very slightly; the mean value per unit is therefore :

$$\frac{q^2v^2l^2}{12g\mathrm{EI}}$$

and under this uniform effect supposed to act statically, the girder takes an increase in deflection of :

$$f = \frac{5l^4}{384\text{EI}} \times \frac{q^2v^2l^2}{12g\text{EI}}.$$

But as the train runs onto the bridge at speed, the centrifugal force increases very rapidly and can be considered as acting as a sudden application of the load, which is true for short girders (see No. 13 below) whence doubled deflection :

$$2f = \frac{5l^4}{384\text{EI}} \times \frac{q^2v^2l^2}{6g\text{EI}} \quad . \quad . \quad . \quad (3)$$

This double deflection corresponds to a greater value of $\frac{1}{\rho}$, but we do not take it into account precisely because there is compensation due to the doubled deflection.

To be definitive, the total dynamic deflection F_d of the girder when the train at speed covers it completely is composed of :

1. the static deflection from ql;

2. the deflection due to centrifugal force suddenly applied whence

$$\text{F}_d = \frac{5l^4}{384\text{EI}}q + \frac{5l^4}{384\text{EI}} \times \frac{q^2v^2l^2}{6g\text{EI}} \quad . \quad (4)$$

The ratio of F_d to the static deflection F_s is :

$$\frac{\text{F}_d}{\text{F}_s} = 1 + \frac{qv^2l^2}{6g\text{EI}} \quad . \quad . \quad . \quad (5)$$

and as the *primary* stresses on the flanges and diagonals are proportional to the deflections, we deduce from (5) for the case of the *single* rolling load q :

$$\frac{t_d}{t_s} = 1 + \frac{qv^2l^2}{6g\text{EI}} = 1 + t_s \times \frac{4v^2}{1.5g\text{E}h} \quad (6)$$

The same problem has been dealt with by another method by Mr. Renaudot (*Annales des Ponts et Chaussées de France*, 1861), and he obtained the same formulæ (5) and (6) above.

* * *

4. Actually as we have seen above, the radius of curvature varies over the length of the bridge. Taking the unfavourable case of its being constant and supposing that the train runs over an arc of circle of minimum radius given by the formula (1) above, that is then :

$$\frac{1}{\rho} = \frac{1}{8\text{EI}}ql^2;$$

whence the centrifugal force per linear unit,

$$\frac{\text{M}v^2}{\rho} = \frac{qv^2}{g} \times \frac{1}{8\text{EI}}ql^2 = \frac{q^2v^2l^2}{8g\text{EI}} \quad (7)$$

$$2f = \frac{5l^4}{384\text{EI}} \cdot \frac{q^2v^2l^2}{4g\text{EI}},$$

$$\text{F}_d = \frac{5l^4}{384\text{EI}} \cdot q + \frac{5l^4}{384\text{EI}} \cdot \frac{q^2v^2l^2}{4g\text{EI}},$$

$$\frac{\text{F}_d}{\text{F}_s} = 1 + \frac{qv^2l^2}{4g\text{EI}},$$

$$\frac{t_d}{t_s} = 1 + \frac{qv^2l^2}{4g\text{EI}} = 1 + t_s \cdot \frac{4v^2}{g\text{E}h} \quad (8)$$

$$t_s = \frac{ql^2h}{16\text{I}},$$

h is the depth of the girder.

* * *

5. A German professor, Mr. Zimmer-

(1) See *Bulletin of the International Railway Congress Association*, January 1929 number, p. 109.

mann, dealing with the same question [1], obtained the formula :

$$\frac{t_d}{t_s} = 1 + t_s \cdot \frac{4v^2}{1.5\,(gEh - v^2 t_s)} \qquad (9)$$

giving results little different from those obtained with formula (6) above, as $v^2 t_s$ is always small in comparison with (gEh), and neglecting this term, the Zimmermann formula is that of (6).

As application, he deals with the case of a girder with $h = 3.50$ m. (11 ft. 6 in.), $v = 18$ m. (59.055 feet) that is 65 km. (40.39 miles) per hour, $t_s = 6$ kgr. per mm² (3.81 Engl. tons per sq. inch).

The formulæ (6) or (9) give for $E = 18\,000$ and $td = t_s\,(1 + 0.0085)$, and the formula (8) $td = t_s\,(1 + 0.013)$.

He also considers the case of $h = 0.3$ = 28 m. (91.866 feet) *i. e.* 100 km./h. (62.14 miles); $t = 6$ kgr. (3.81 Engl. tons per sq. inch) $E = 18\,000$; and the formulæ (6) or (9) give :

$$t_d = t_s\,(1 + 0.26)$$

and the formula (8) :

$$t_d = t_s\,(1 + 0.36)$$

which is certainly closer to reality and probably still below it. See No. 13 below, the experiments of Mr. Rabut.

* * *

6. Let us now examine (fig. 0) the case of a single rolling load P crossing the bridge at v speed.

Fig. 0.

With the load at the middle of the bridge at any given point we have :

$$\frac{d^2y}{dx^2} = \frac{Px}{2\varepsilon} = \frac{1}{\rho}$$

the maximum value of which is :

$$\frac{1}{\rho} = \frac{Pl}{4\varepsilon}.$$

The maximum centrifugal force is therefore :

$$\frac{P}{g} \cdot \frac{v^2}{\rho} = \frac{P^2 v^2 l}{4gEI}$$

which acting as a suddenly applied load causes a dynamic deflection :

$$2f = 2 \times \frac{l^3}{48\,EI} \times \frac{P^2 v^2 l}{4gEI}$$

and the total dynamic deflection is then :

$$F_d = \frac{Pl^3}{48EI} + \frac{l^3}{48EI} \times \frac{P^2 v^2 l}{2gEI}$$

whence, abstracting the dead load :

$$\frac{F_d}{F_s} = 1 + \frac{Pv^2 l}{2gEI} = \frac{t_d}{t_s} = 1 + \frac{8 t_s v^2}{2gEh}. \qquad (10)$$

Mr. Phillips in dealing with the question made great use of mathematical analysis; he found [1] :

$$\frac{F_d}{F_s} = 1 + \frac{Pv^2 l}{3gEI} = \frac{t_d}{t_s} = 1 + \frac{8 t_s v^2}{3gEh}. \qquad (11)$$

This same formula has recently been given by Mr. Timoshenko, who probably was not aware that it has been known for the last seventy five years.

The real facts as shown experimentally are nearer (10) than (11).

* * *

The different formulæ given above show that for a given stress t_s the coef-

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(1) See *Bulletin of the Railway Congress*, January 1929, p. 109.

(1) *Annales des Mines*, 1855.

ficient of increment due to the centrifugal force diminishes as h increases, or, therefore, as the span increases; on the other hand, this coefficient increases proportionally to the square of the speed of the train and this is confirmed by experience.

Furthermore, the fatigue increases considerably if the girder has taken a set downwards which ultimately occurs with triangulated structures, as the uprights and diagonals connect the two flanges imperfectly, the more so as the rivets of the joints, racked by the secondary stresses, end by slackening more or less whence a reduction in the moment I and consequently an increase in the deflection.

The plate-web girders and the Vierendeel girders are not subject to this weakness. We have supposed above that the axis of the girder was straight; it is important that this should be maintained and that there should be even a slight upwards camber.

§ 3. — Vibrations.

7. Every dynamic effort is accompanied by vibration. In the following we suppose that the speed of propagation of

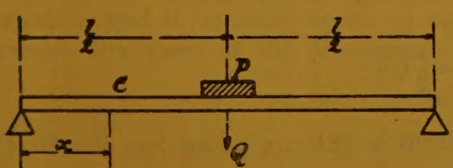

Fig. 1.

the stresses and deformations is infinite; for this speed see our *Cours de stabilité des structures* (*Lectures on the stability of structures*), vol. I, 5th edition, page 88.

Let us take then a girder (fig. 1) carried on two supports with straight axis, and uniform section.

It carries :

1. Its dead weight p_1, a uniformly distributed load p_2, that is per unit of length a total $p = p_1 + p_2$ and this over its full length.

2. At its centre, a weight P.

Under the static action of $1 + 2$, the girder takes a certain deflection, it little matters what.

It receives at its middle an impulse from a force Q which acts suddenly.

The force Q acting statically impresses on the girder a deflection.

$$f = \frac{Ql^3}{48EI}.$$

* * *

At an instant t of the action of Q, the deflection at the middle will be z, which corresponds to a local static stress q given by the equation

$$z = \frac{ql^3}{48EI}$$

and at this instant the bending of the girder at C at the distance x (see volume I, page 206) will be

$$y = z\left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right).$$

These elements being given, let us now apply the equation of the kinetic energy :

$$\frac{mv^2}{2} - \frac{mv_0^2}{2} = \int Q ds \cos\mu$$

of which we are going to evaluate the different terms.

* * *

At the point C, at the distance x, the mass of the girder and its load $= \frac{pdx}{g}$; its vertical speed is :

$$\frac{dy}{dt} = \left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)\frac{dz}{dt}$$

whence :

$$d \cdot \frac{1}{2}mv^2 = \frac{pdx}{2g}\left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)^2\left(\frac{dz}{dt}\right)^2$$

and at the same instant the mass of weight P at the middle gives :

$$\frac{1}{2}mv^2 = \frac{P}{2g}\left(\frac{dz}{dt}\right)^2$$

whence, total of the kinetic energy of the masses at the instant t, in other terms, the value of the first member of the equation :

$$\frac{1}{2g}\left(\frac{dz}{dt}\right)^2\left[P + 2\int_0^{\frac{l}{2}} p\left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)^2 dx\right] = \frac{1}{2g}\left(\frac{dz}{dt}\right)^2\left[P + \frac{17pl}{35}\right] = \frac{A}{2g}\left(\frac{dz}{dt}\right)^2$$

in taking :

$$A = P + \frac{17pl}{35}.$$

* * *

Let us now calculate the work of the stresses in the girder due to Q at the instant t :

$$M_x = \frac{1}{2}qx = \frac{x}{2}Q\frac{z}{f};$$

this internal work is set up gradually, whence :

$$\text{Total work} = 2\int_0^{\frac{l}{2}}\frac{M_x{}^2dx}{2EI} = 2\int_0^{\frac{l}{2}}\frac{x^2Q^2z^2}{4f^2\times 2EI}dx = \frac{Q^2z^2}{4f^2EI}\int_0^{\frac{l}{2}}x^2dx = \frac{Q^2z^2}{4f^2EI}\times\frac{l^3}{24}.$$

This work is negative because : cos. $\rho =$ cos. $180^\circ = -1$ and at introducing therein the value of f found above in terms of Q, we find that the work done in bending the girder $= -\frac{Qz^2}{2f}$.

* * *

The work of the impulse due to $Q = +Qz$.
Whence for the general equation of the loads and kinetic energies :

$$\frac{A}{2g}\left(\frac{dz}{dt}\right)^2 = +Qz - \frac{Qz^2}{2f} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (1)$$

It is not necessary to take into account the work due to p and P, as these loads are *a priori* balanced by the tensions of the girder.
From equation (1) we get :

$$\frac{dz}{dt} = v = \sqrt{\frac{2g}{A} Qz\left(1 - \frac{z}{2f}\right)} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2)$$

and

$$t'' = \sqrt{\frac{Af}{gQ}}\left[\text{arc sin } \frac{z-f}{f} + \frac{\pi}{2}\right] \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad (3)$$

These formulæ (2) and (3) give us :

for $z = 0$, $v = 0$ and $t'' = 0$;

for $z = f$, $v = \sqrt{\frac{gQ}{A}}\,f$ and $t'' = \frac{\pi}{2}\sqrt{\frac{Af}{gQ}}$

for $z = 2f$, $v = 0$ and $t'' = \pi\sqrt{\frac{Af}{gQ}}$.

The second integration shows that when $z = f$, the speed is the maximum.
When the maximum of z is reached, the girder reacts, returns on itself and rises by $2f$ in the same time; the duration of the complete vibration is then :

$$T'' = 2\pi\sqrt{\frac{Af}{gQ}} = 2\pi\sqrt{\frac{l^3}{48EIg}\left(\frac{17pl}{35} + P\right)}.$$

It will be noticed that the duration of the vibration is independent of the Q which caused it, in other words, of the static deflection f due to Q. — Q increases the speed of the phenomenon but not the duration.

* * *

If $P = 0$, and taking $g = 9.81$ m. (32 feet 2 1/4 in.) we get :

$$T'' = 0.634\, l^2\sqrt{\frac{p}{gEI}} = 0.2\, l^2\sqrt{\frac{p}{EI}} = 1.754\sqrt{f_1}$$

f_1 being the static deflection due to the load p covering the whole of the bridge.
The number of vibrations per second or the frequency is in this case :

$$n = \frac{1}{T} = \frac{0.57}{\sqrt{f_1}}.$$

The deflection f_1 should be calculated in metres.

The frequency n will be seen to diminish when l and p increase.
All things being equal, the frequency diminishes when f_1 increases.

* * *

8. Let us return to the formula for T″ above; make $P = 0$ and $p =$ dead weight $p_1 +$ load p_2, the whole per linear unit; the formula becomes :

$$T = 2\pi\sqrt{\frac{5l^4 p_2}{384 EIg} \cdot \frac{136}{175} \cdot \frac{p_1 + p_2}{p_2}}.$$

Let f_2 be the static deflection in metres due to $(p_2{}^{l})$, and we get :

$$T = 1.77\sqrt{\frac{p_1 + p_2}{p_2} \cdot f_2} = \sqrt{\frac{(p_1 + p_2)}{0.31\, p_2} \times f_2}.$$

* * *

9. If we omit p_1 and p_2 and only retain P, the formula becomes :

$$T'' = 2\pi\sqrt{\frac{Pl^3}{48EI} \cdot \frac{1}{g}} = 2\pi\sqrt{\frac{f'}{g}}$$

f' is the static deflection due to P; and if it be calculated in metres we get very closely

$$T = 2\sqrt{f'}.$$

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10. Let us now suppose (fig. 2) a force Q acting at a given point D of the girder.

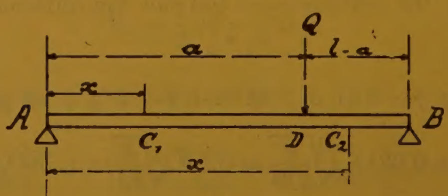

Fig. 2.

The deflection at D under Q when stationary can be expressed by :

$$f = \frac{Qa^2 (l - a)^2}{3l\varepsilon}$$

The deflections of AD can be expressed by :

$$y = \frac{f}{2a^2(l-a)}[x^3 - a(2l-a)x];$$

The deflections of DB :

$$y = \frac{f}{2a(l-a)^2}[3lx^2 - x^3 - 2l^2x - a^2x + la^2].$$

At an instant t of the static action of Q, the deflection at D will be z :

$$z = \frac{qa^2}{3l\varepsilon}(l-a)^2.$$

And at a given point C_1 of AD we shall have :

$$y = \frac{z}{2a^2(l-a)}[x^3 - a(2l-a)x],$$

And at a point C_2 of DB :

$$y = \frac{z}{2a(l-a)^2}[3lx^2 - x^3 - 2l^2x - a^2x + la^2].$$

At the point C_1 we have :

$$d \cdot \frac{1}{2}mv_1^2 = \frac{pdx}{2g} \times \left(\frac{dy}{dt}\right)^2 = \frac{p.dx}{2g}\left[\frac{x^3 - a(2l-a)x}{2a^2(l-a)}\right]^2\left(\frac{dz}{dt}\right)^2$$

At the point C_2 :

$$d \cdot \frac{1}{2}mv^2_2 = \frac{pdx}{2g}\left[\frac{3lx^2 - x^3 - 2l^2x - a^2x + la^2}{2a(l-a)^2}\right]^2\left(\frac{dz}{dt}\right)^2$$

The total of the kinetic energies acting on the girder is :

$$\int_0^a d \cdot \frac{1}{2}mv_1^2 + \int_a^l d \cdot \frac{1}{2}mv^2_2 = \frac{p}{2g}\left(\frac{dz}{dt}\right)^2 \left\{ \int_0^a \left[\frac{x^3 - a(2l-a)x}{2a^2(l-a)}\right]^2 dx + \int_a^l \left[\frac{3lx^2 - x^3 - 2l^2x - a^2x + la^2}{2a(l-a)^2}\right]^2 dx \right\} =$$

$$= \frac{p}{2g}\left(\frac{dz}{dt}\right)^2 \frac{1}{105a^2(l-a)^2}\left[\frac{1}{a^2}(23a^7 + 35l^2a^5 - 56la^6) + \frac{2l^7 - 23a^7 - 7l^5a^2 + 140l^3a^4 - 182l^2a^5 + 105la^6 - 35l^4a^3}{(l-a)^2}\right]$$

$$= \frac{p}{2g}\left(\frac{dz}{dt}\right)^2 \times A = \frac{Ap}{2g}\left(\frac{dz}{dt}\right)^2$$

At an instant t the moment at C_1 is :

$$(M_x)_{c_1} = \frac{q(l-a)}{l} x = x \times \frac{Q(l-a)}{lf} z$$

And the point C_2 :

$$(M_x)_{c_2} = q \frac{a}{l} x = x \times \frac{Qa}{lf} z.$$

The total work of the stresses in the girder :

$$\frac{-1}{2EI}\left[\int_0^a M^2_{xc_1}\,dx + \int_0^{l-a} M^2_{xc_2}\right] = \frac{-Q^2(l-a)^2 a^2 z^2}{6EIlf^2} = -\frac{Qz^2}{2f}$$

replacing Q in terms of f given above.
The work of impulsion $Q = +Qz$.

* * *

The general equation of the kinetic energies is then :

$$\frac{Ap}{2g}\left(\frac{dz}{dt}\right)^2 = Q\left(z - \frac{z^2}{2f}\right)$$

whence the speed of the point D at the instant t :

$$\frac{dz}{dt} = v = \sqrt{\frac{2gQ}{Ap}\left(z - \frac{z^2}{2f}\right)}$$

$$t = \sqrt{\frac{Ap}{g} \times \frac{f}{Q}}\left[\text{arc sin}\,\frac{z-f}{f} + \frac{\pi}{2}\right]$$

* * *

For $z = 0,$ $v = 0$ and $t = 0$

For $z = f,$ $v = \sqrt{\dfrac{gfQ}{Ap}}$ and $t_1 = \dfrac{\pi}{2}\sqrt{\dfrac{Ap}{g} \times \dfrac{f}{Q}}$

For $z = 2f,$ $v = 0$ and $t_2 = \pi\sqrt{\dfrac{Ap}{g} \times \dfrac{f}{Q}}$

The duration of a complete vibration is then :

$$T = 2t_2 = 2\pi\sqrt{\frac{Ap}{g} \times \frac{f}{Q}}.$$

Replacing

$$\frac{f}{Q} = \frac{a^2(l-a)^2}{3lEI},$$

we get :

$$T = 2\pi\sqrt{\frac{Ap}{g} \times \frac{a^2(l-a)^2}{3lEI}}.$$

The value of A is given above; we reproduce it :

$$A = \frac{1}{105a^2(l-a)^2}\left[23a^5 + 35l^2a^3 - 56la^4 + \right.$$

$$\left. + \frac{1}{(l-a)^2}(2l^7 - 23a^7 - 7l^5a^2 + 140l^3a^4 - 182l^2a^5 + 105la^6 - 35l^4a^3)\right].$$

If the impulse Q is given at the middle, which corresponds to taking $a = \frac{l}{2}$, the expression above of T″ becomes :

$$T'' = 2\pi\sqrt{\frac{l^3}{48EIg} \times \frac{17pl}{35}}.$$

formula already found previously.

* * *

We see that the duration T″ depends upon a, that is to say on the point of action of the load; its maximum corresponds to the value $a = \frac{l}{2}$.

For $a = 0$ or $a = l$, we find $T = \frac{0}{0}$ of which the real value is zero.

We again note that the duration of a vibration does not depend upon its amplitude.

§ 4. — Shock and vibration.

11. The girder (fig. 3) carries a uniformly distributed load p equal to its dead weight p_1 plus the live load p_2; the whole per linear unit $p = p_1 + p_2$ that is pl in all.

It receives at its middle the shock from a weight P falling from a height H, but the effect on the girder corresponds to a height $H_1 = H \frac{P}{P + 0.49pl}$ [see our *Cours de stabilité* (*Lectures on stability*), vol. I, 5th edition].

Let us follow the reasoning of the preceding case and at the same time abbreviate it.

At an instant t of the action of P, the deflection at the middle is z, which corresponds to a static effect P_1, given by the expression $z = \frac{P_1 l^3}{48 EI}$ of which the static maximum is $f = \frac{Pl^3}{48 EI}$.

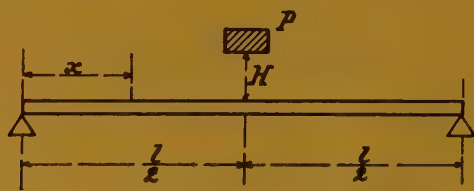

Fig. 3.

At this instant t, the bending of the girder due to P, will be at the distance x:

$$y = z\left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right) \text{ whence } \frac{dy}{dt} = \left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)\frac{dz}{dt}.$$

* * *

We will apply the equation of the kinetic energy starting from the period when the shock is communicated to the girder.

As regards the girder we have :

$$d \cdot \frac{1}{2} mv^2 = \frac{pdx}{2g} \times \left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)^2 \left(\frac{dz}{dt}\right)^2;$$

and as regards the mass of the weight P :

$$\frac{1}{2} mv^2 - \frac{1}{2} mv^2_0 = \frac{P}{2g} \cdot \left(\frac{dz}{dt}\right)^2 - PH_1$$

whence total of the kinetic energies of the masses at the instant t:

$$\frac{1}{2g}\left(\frac{dz}{dt}\right)^2 \left[P + p \times 2\int_0^{\frac{l}{2}} \left(3\frac{x}{l} - 4\frac{x^3}{l^3}\right)^2 dx\right] - PH_1 =$$

$$= \frac{1}{2g}\left(\frac{dz}{dt}\right)^2 \left[P + \frac{17pl}{35}\right] - PH_1 = \frac{A}{2g}\left(\frac{dz}{dt}\right)^2 - PH_1.$$

* * *

The work of the stresses in the girder due to P at the instant t:

$$M_x = \frac{P_1}{2} x = \frac{x}{2} \times P \frac{z}{f}.$$

Work

$$= \frac{1}{2EI} \times 2 \int_0^{\frac{l}{2}} M_x^2\, dx = -\frac{Pl^3}{48EI} \times \frac{z^2 P}{2f^2} = -P\frac{z^2}{2f}.$$

The work of the weight P from $t = 0$ is $+ Pz$, whence for the general expression of the work and kinetic energy from $t = 0$ to t:

$$\frac{A}{2g}\left(\frac{dz}{dt}\right)^2 - PH_1 = + Pz - P\frac{z^2}{2f}$$

$$\frac{dz}{dt} = v = \sqrt{\frac{2gP}{A}\left(H_1 + z - \frac{z^2}{2f}\right)}$$

$$dt = \sqrt{\frac{A}{2gP}} \times \frac{dz}{\sqrt{H_1 + z - \frac{z^2}{2f}}}$$

Integrating and laying down the condition that when for $z = 0$, $t = 0$, we get:

$$t = \sqrt{\frac{Af}{gP}}\left[\text{arc sin}\frac{z - f}{\sqrt{f^2 + 2fH_1}} + \text{arc sin}\frac{f}{\sqrt{f^2 + 2fH_1}}\right].$$

The speed v is nil for:

$$H_1 + z - \frac{z^2}{2f} = 0 \text{ whence } z = f \pm \sqrt{f^2 + 2fH_1} \quad \begin{cases} z_1 = f + \sqrt{f^2 + 2fH_1} \\ z_2 = f - \sqrt{f^2 + 2fH_1} \end{cases}$$

The total distance moved over is:

$$F = + z_1 + (-z_2) = 2\sqrt{f^2 + 2fH_1}.$$

During the second part of the distance the mass P is accelerated by $-\frac{P}{g} \cdot \frac{d^2 z}{dt^2}$ and during the second part $+\frac{P}{g} \cdot \frac{d^2 z}{dt^2}$; so that there is some degree of compensation and this is why we ignore these accelerations.

$$t_1 = \sqrt{\frac{Af}{gP}}\left[\text{arc sin}\frac{z_1 - f}{\sqrt{f^2 + 2fH_1}} + \text{arc sin}\frac{f}{\sqrt{f^2 + 2fH_1}}\right]$$

$$t_1 = \sqrt{\frac{Af}{gP}}\left[\frac{\pi}{2} + \text{arc sin}\frac{f}{\sqrt{f^2 + 2fH_1}}\right]$$

$$t_2 = \sqrt{\frac{Af}{gP}}\left[\text{arc sin}\frac{z_2 -}{\sqrt{f^2+2fH_1}} + \text{arc sin}\frac{f}{\sqrt{f^2+2fH_1}}\right]$$

$$t_2 = \sqrt{\frac{Af}{gP}}\left[-\frac{\pi}{2} + \text{arc sin}\frac{f}{\sqrt{f^2+2fH_1}}\right].$$

The total time of a half vibration is :

$$t_1 + (-t_2) = \pi\sqrt{\frac{Af}{gP}}$$

and for a complete vibration :

$$T'' = 2\pi\sqrt{\frac{Af}{gP}} = 2\pi\sqrt{\frac{l^3}{48gEI}\left(P + \frac{17pl}{35}\right)},$$

that is to say the same expression T″ as before, No. 8, figure 1.

In conclusion, whatever the stresses acting on the girder at its middle, whether by the action of a force Q or a shock PH, or by suddenly applied loading, the period T″ of the vibration is always the same for a given static load $\left(P + \frac{17pl}{35}\right)$ which is what is known as the *vibration peculiar to the girder*.

Other than at the middle, the duration varies with the point of application of the acting force.

It should be noted that the stress due to the shock is measured by the expression of the maximum deflection z_1 given above, which is a function of H_1 (reduced height of fall) and of f (static deflection due to the weight P causing the shock).

We see that z_1, or the supplementary stress due to the shock, depends upon the mass of the girder receiving it, as H_1 is a function of this mass.

The relative supplement of stress due to this shock depends again upon the total mass of the girder receiving the shock, dead weight and load carried, in other terms, it depends upon F, its own static deflection; the relative momentary supplement is expressed by $\frac{z_1}{F}$ and so is so much the less as F is greater.

We will not develop any further the theoretical part, and in particular will not give the mathematical theory of Professor Timoshenko which is much more complicated than the simple calculations above and is hardly confirmed by experience.

§5. — Applications.

12. If in the formula :

$$T = 2\pi\sqrt{\frac{l^3}{48EIg} \times \frac{17pl}{35}}$$

found above we make $E = 20\,000$; $g = 9\,810$, and if R be the stress per square millimetre due to the load pl, we find

$$T'' = \frac{l}{5\,550}\sqrt{\frac{R}{h}}$$

h being the constant height of the girder which is taken as having parallel flanges.

* * *

Let us take a girder 6 m. long, $h = 0.60$, the maximum stress being 12 kgr.:

$$T'' = \frac{6\,000}{5\,550}\sqrt{\frac{12}{600}} = \left(\frac{1}{6.6}\right)''$$

frequency $n = 6.6$ vibrations per second under the load.

* * *

Take a girder 60 m. long, with $h = 6$ m., the maximum stress under full load being 12 kgr. :

$$T'' = \frac{60\,000}{5\,550}\sqrt{\frac{12}{6\,000}} = \left(\frac{1}{2}\right)''$$

frequency $n = 2$ vibrations.

If under the simple dead weight the stress is 5 kgr., we shall have :

$$T'' = \frac{60\,000}{5\,550}\sqrt{\frac{5}{6\,000}} = \left(\frac{1}{3.2}\right)''$$

frequency $n = 3.2$ vibrations per second.

We see the difference of frequency according as to whether the bridge is unloaded or fully loaded.

If we wanted to consider the case of the bridge partially loaded, the procedure given above under No. 10 must be followed.

§ 6. — Experiments.

Following the theoretical considerations given above, let us now review the most characteristic experiments that have been made.

Amongst these the most suggestive, and possibly the most precise (so far as I am aware) are those given by Mr. Rabut in his two papers :

Etude expérimentale des ponts métalliques (Experimental investigation of metal bridges). — (Annales des Ponts et Chaussées, October 1896.)

Expérimentation des ponts (The testing of bridges). — Annales des Ponts et Chaussées, 1901.)

13. *Shocks.* — *Rail joints.* — In the case of railway bridges, the shocks are chiefly due to the rail joints and to flats on the wheels and the resulting stresses are especially felt on bridges of small span.

Mr. Rabut carried out experiments at length on the effect of a rail joint on a 4-m. (13 ft.-1 1/2 in.) span bridge, the point being at the middle of the bridge.

He ran a locomotive over this bridge at various increasing speeds up to 80 km. (50 miles) an hour.

With a continuous rail, *i. e.* without joint, the static deflection due to the locomotive was doubled, the effect of the sudden addition of the load, and perhaps also of the vertical centrifugal force (see § 2 above).

With a joint of normal width and a speed of 80 km. (50 miles) the deflection was tripled.

With a joint of 2 to 3 cm. (3/4 to 1 3/16 inches) gap, the deflection reached as much as five times its static value.

These are effects due to shock of which we can calculate the height of fall.

From the formula given in No. 11,

$$z_1 = f + \sqrt{f^2 + 2fH_1}$$

we obtain :

$$H_1 = \frac{z_1^2 - 2z_1 f}{2f}.$$

For $z_1 = 2f$, we have $H_1 = 0$;
For $z_1 = 3f$, we have $H_1 = 1.5f$;
For $z_1 = 4f$, we have $H_1 = 4f$.

For so small a span, the static deflection f under the wheel of the locomotive should be of the order of 2 to 3 mm. (5/64—1/8 inch) and therefore the value

of H_1 would be at most ten or so millimetres (3/8 inch).

It is sometimes said that the shock due to a pair of wheels depends solely upon the weight thereof, because the springs separate the wheels and axle from the rest of the engine; we consider that the intensity of the shock depends upon the total weight carried by the axle, as the most the springs can do is to attenuate it somewhat owing to their elasticity which is however always small.

* * *

Let us now see the effect of a normal rail joint on a 6-m. (19 ft. 8 1/4 in.) span bridge. The train was hauled by an electric locomotive having two groups

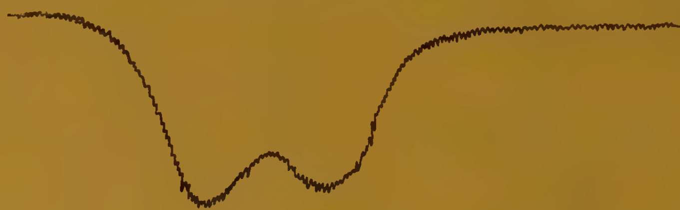

Fig. 4.

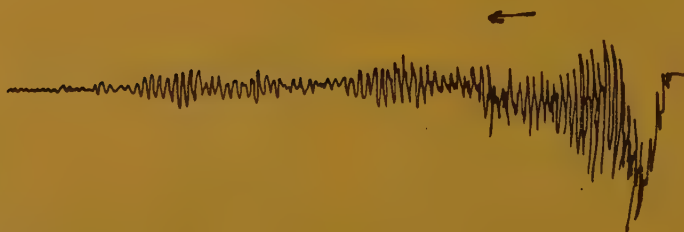

Fig. 5.

Fig. 6.

of four pairs of wheels very closely spaced.

Figure 4 is the diagram at 6 km. (3.7 miles) an hour speed; the passage of the two groups of wheels is clearly seen.

Figure 5 gives the diagram at 50 km. (31 miles) an hour; it in no way resembles that of figure 4; in this second case the diagram shows a sudden run onto the bridge with very close and very marked vibrations, and then these vibrations are attenuated.

Mr. Rabut said that in this second case the vibrations have doubled the stress of the piece but he omitted to give the coefficient of amplification of his recording apparatus; however this may be, the comparison can be made.

* * *

Figure 6 gives the diagram recorded on a stringer during the passage of a rake of wagons; the vibrations at the speed of 20 km. (12.4 miles) per hour are feeble except that at every 3 m. (9 ft. 10 1/8 in.) (the axle spacing), we see a vibration of large amplitude resulting from the shock of a wheel at the rail joint, whence a sudden and enormous increase of the stress in the stringer.

« This », said Mr. Rabut, « with the hundred other similar diagrams I have, is the demonstration of the effect of the rail joints. »

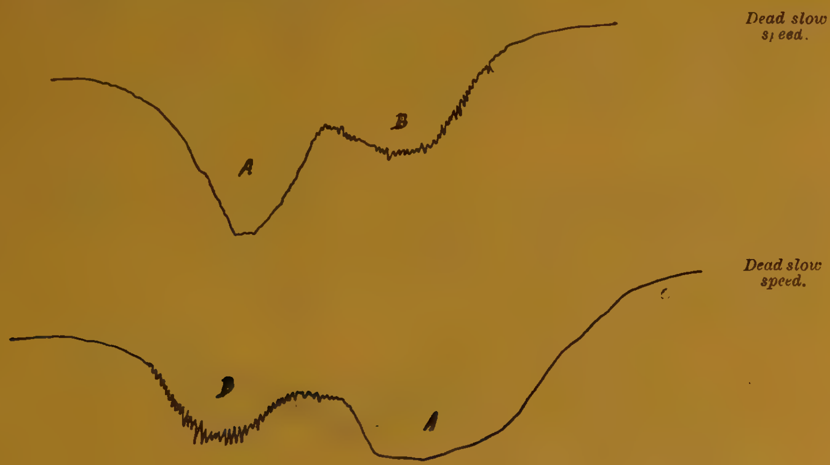

Fig. 7.
A = Locomotive. — B = Tender.

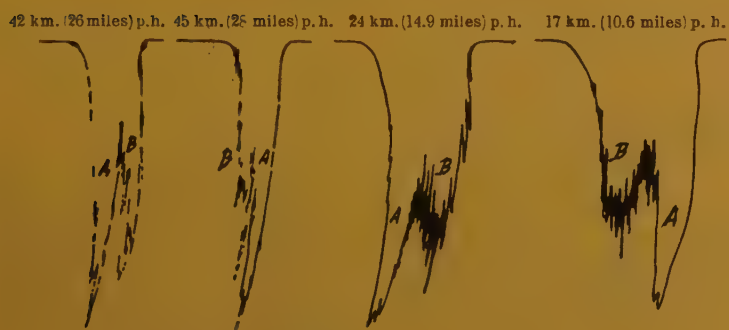

Fig. 8. — Effect of flats on wheel of tender.

14. *Braking.* — *Starting.* — Professor Godard, Chief Engineer for Bridges on the French Midi Railway, has said that the effect produced by sudden braking of the vehicles of a train can be likened to a shock; experience he said, shows that braking can increase by 10 to 15 % the static effect of the wheels of the vehicles. This effect is evidently due to the action of the loads of the wagons reacting, owing to their inertia, on the suddenly checked springs.

A similar effect is produced during a rather too sudden start.

15. *Wheel flats.* — Let us now consider the effect of wheel flats.

Above we give the test of a small viaduct of 5 m. (16 ft. 5 in.) span; the test train consisted of an engine and tender.

Figure 7 shows the passage of the train at dead slow speed; the diagram A of the engine shows no vibration, whereas on the contrary that B of the tender shows some disturbance.

Figure 8 shows the diagrams taken at different speeds; in all cases the A diagrams of the engine show no vibration, whereas the B tender diagrams show more and more marked vibrations to the extent that their amplitude reaches almost the deflection due to the engine although the tender is half the weight.

As a matter of fact, on examination the wheels of the tender were found to have a single flat though little marked and therein was the cause of these intense vibrations.

It is recognised that flats are amongst the causes of broken rails; Mr. Rabut quotes the case of an engine which, running from Paris to Limoges, broke a hundred rails on one side of the line and on its return broke nearly fifty on the other side; after inspection one of the wheels was found to have a large flat.

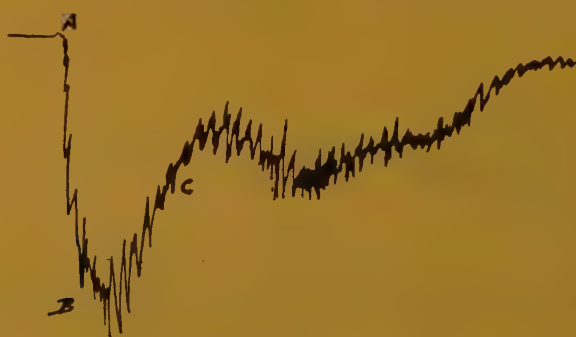

Fig. 9. — Deflection recorded while an express train crossed the bridge.

* * *

The counterbalance weight of the coupled wheels of locomotives sometimes produce the hammering effect of flats (see No. 20 below) but not always, however; this figure 8 clearly shows that the engine at high speeds did not set up any vibration.

* * *

16. Figure 9 gives the diagram of the bending of one of the 30-m. (98 ft.-5 1/8 in.) spans of the Asnières bridge when crossed by an express at 108 km. (67.11 miles) an hour.

The speed of the paper of the cylinder recording the deflection was 10 mm. (3/8 inch) a second. Mr. Rabut has not given the coefficient of amplification.

The girders of this bridge have plate webs, and are 2.30 m. (7 ft. 6 9/16 in.) high for a span of 30 m. (98 ft. 5 1/8 in.).

From A to B the deflection increases suddenly; this is the effect of the locomotive passing over it; the locomotive leaves the bridge at the moment at which the deflection is C; after C the carriages come on to and load the bridge, and the

diagram ends by a few vibrations which very soon die out.

The mean curve through this diagram represents the deflection due to the rolling loads.

The oscillations on both sides of this curve are the vibrations due to the local shocks of the locomotive wheels (counterbalance effect), of the tender and the carriage (probably small flats or oscillations of the loads on the springs) and finally to the irregularities of the track (rail joints, local wear of rails, etc.).

The T″ of these vibrations is very variable, which is the result of the loads on the bridge changing constantly in place and in value. There is no appearance of resonance and this because the variation of T″ sets up waves which neutralise one another partially.

* * *

We will not speak of the American, Russian, and English tests which are more recent than those of Mr. Rabut but which are neither more precise, nor more instructive and moreover were made with rolling stock and on structures both rather different from our own.

§ 7. — Resonance.

17. Resonance is the coincidence of the periods of application of a force and the period of the vibration proper to the part on which the force acts.

Let a force P act suddenly at the middle of the bar AB; this will take a dynamic deflection f; then it will react and will take an equal reverse deflection f' and then will repass its primitive alignment AB; it will therefore have moved $4f$, back and fro, and that in a time T″ calculated above, a time which is independent of the cause P.

If at the moment the bar AB has retaken up its horizontal line the force P again acts, the deflection f becomes F; the new period will cover the distance of 4F *but will have the same duration* T″,

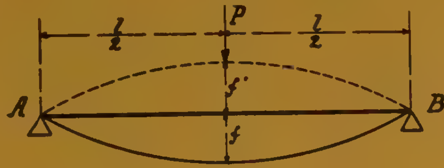

Fig. 10.

—and so on. If the synchronism persists, the deflection will become greater and greater and thereby more dangerous.

The persistance of this synchronism is called *resonance* and may cause accidents : one of the best known is that of the Angers suspended bridge in which resonance with the regular tramp of soldiers occurred — the bridge broke suddenly and threw the troop of men into the water.

Ships have disappeared mysteriously and the loss has been ascribed by some people to synchronism setting up between the deformations of the frame work of the hull and the strokes of the engine pistons resulting at a given moment in the breaking up of the hull and the sinking of the ship.

* * *

Analogous cases can arise with flying machines and dirigeables.

* * *

The following interesting and suggestive experiment by Mr. Benischke was reported in the « *Technique Aéronautique* » of the 1st May 1910, page 351.

To a strong table having its legs fastened to the floor, was secured a small electric motor, well balanced, except that it had on its shaft a weight of 40 gr.

(0.088 lb.) at a radius of 60 mm. (2 3/8 inches) from the centre (fig. 11); the resulting centrifugal force is given by the formula :

$$Q = \frac{MV^2}{r} = \frac{0.04}{9.8} \times \frac{V^2}{0.06} = \frac{V^2}{14.7}.$$

The horizontal impulses Q caused the four legs of the table to bend; the maxi-

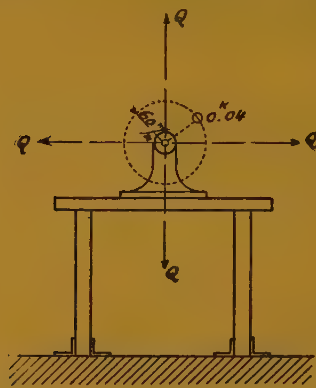

Fig. 11.

mum horizontal deflection was 5 mm. (3/16 inch) in both directions, and occurred at the speed of 300 revolutions per minute, which gives :

$$V = 2\pi r \times \frac{300}{60} = 1.885 \text{ m.}$$

whence we get :

$$Q = 0.242 \text{ kgr.}$$

This was a *resonance* effect, that is to say of synchronism between the impulses Q at 300 revolutions and the vibratory movement peculiar to the legs of the table themselves.

On the speed exceeding 300 revolutions, the value of Q increases and the deflection of the table legs diminishes and even completely disappears because the synchronism being broken, the frequency of the impulses Q counteracts the frequency of the vibrations of the table legs and even at a certain value of V completely neutralises them.

The vertical impulses Q causes the heavy table top to bend and vibrate in the vertical direction; the maximum effect occurred at 1 300 revolutions so that Q = 4.43 kgr. (9.71 lb.).

At this speed the vibrations of the table top were very strong, a key laid on it being thrown off the surface. If the counterweight had been 4 kgr. (8.8 lb.) instead of 40 gr. (0.088 lb.) the table would have been broken.

In order to provide a remedy against resonance, it is necessary either to modify the speed V of the motor or to change the sections or lengths of the vibrating members in order to alter their frequency and thereby avoid the synchronism. Definitely, *resonance* is very dangerous in structures just as in electricity.

*
* *

18. *The English Bridge Stress Committee* appointed in March 1923, used a special *vibrator* (an improvement on that of figure 11), with a view to determining the self frequency $\frac{1}{T}$ of unloaded and loaded bridges.

This vibrator was used to compare the effect of a given engine at different speeds in order to be able to form an appreciation of the influence of the synchronism between the frequency of the bridge itself and that of the periodic force due to the motion of the engine.

This vibrator was described on page 573 of the *Génie Civil* of the 15 June 1929. It has also been used in Germany. It is composed of two symmetrical wheels so as to avoid the horizontal actions Q considered previously and the doubling of the vertical actions.

For a speed of 300 revolutions a minute, the vertical force reached 3 500 kgr.

The device is controlled by an electric motor.

The maximum deflection is recorded and the speed of rotation at the same moment corresponds to the frequency of the bridge (unloaded or loaded).

It was found that the frequency of the bridge when unloaded and the frequency of the vibrations of the bridge itself, which persisted quite a time after a locomotive had crossed over it, were equal.

* * *

19. *Road bridges.* — An American Commission has investigated the dynamic stresses set up by moving loads on *road bridges* (see *Génie Civil* of the 29 June, page 625).

In the case of the railway bridges, the dynamic stress is chiefly due to flats and a little to the stresses due to the incomplete balancing of the reciprocating parts of the locomotive, and finally to the joints of the rails.

In the case of road bridges, the dynamic effect above all comes from the shocks due to irregularities of the roadway; they cannot, however, except in exceptional cases, give rise to oscillations in synchronism with those of the bridge itself.

The Commission arrived at the following conclusions as regards the dynamic increases in stresses on road bridges :

1. For the floor members and main girders for spans not exceeding 12 m. (39 ft. 4 1/2 in.) the moving load should be increased by 25 %.

2. For spans exceeding 12 m. the increase should be obtained from the empirical formula :

$$\frac{15}{L+48}$$

L being the span in metres.

Fig. 12.

Mr. Rabut also carried out experiments on road bridges amongst them on the « Lépine » bridge in Paris, this bridge being 40 m. (131 ft. 2 3/4 in.) span, with a width of 15 m. (49 ft. 2 1/2 in.), and having very heavy flooring, the roadway being laid on small arches of brick.

Figure 12 is the diagram of the passage of a road roller weighing 30 tons; the pointed zig-zags show the effect of the jolts.

Figure 13 is to the same scale, the diagram being obtained whilst a group of 16 men weighing about 1 ton walked across the bridge at a gymnastic step.

The effect of resonance will be observed : a man-ton has given a maximum deflection much greater than the 30-ton roller; had there been a few more men, the deflection might have become dangerous.

Had the 16 men when at the middle jumped together at the required rate,

Fig. 13.

they could have caused the bridge to collapse. This corroborated the accident to the Angers suspension bridge mentioned in No. 17 above.

* * *

20. *Counterbalance.* — One of the factors which might set up resonance is the

action of the counterbalance weights of a locomotive.

In order to make this clear, let us take a concrete example.

Let there be (fig. 14) a wheel carrying a counterbalance weight P at a distance r and acting at the middle of the span of a bridge about 60 m. (196 ft. 10 1/4 in.) long for which T″ unloaded is :

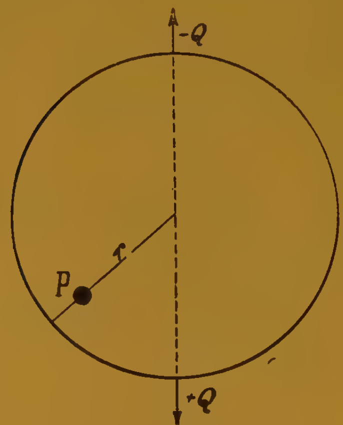

Fig. 14.

$$T = \frac{1''}{3.5}.$$

The vertical centrifugal force has the value of :

$$\frac{MV^2}{r} = \frac{PV^2}{gr} = Q$$

acting alternately upwards and downwards (1).

Let us suppose the circumference of the wheel to be 6 m. (19 ft. 8 1/4). For resonance to occur the distance of 6 m. must be passed over in the time T above : whence a speed per hour :

$$6 \times 3.5 \times 3\,600'' = 75\,600 \text{ m.} = 75.6 \text{ km.}$$
(46.97 miles) per hour.

If the wheel were stationary and gave the blow + Q exactly every $\frac{1''}{3.5}$, the bridge would end by failing. — This is the reason why this speed of 75.6 km. per hour is called the *critical speed.*

Fortunately things do not work out like this :

1. To begin with, the wheel moves, the T of the bridge diminishes, and the synchronism is broken.

2. Furthermore the $T = \frac{1}{3.5}$ of the empty bridge is modified through the other wheels and loads which act on other parts of the bridge and are constantly changing position (see No. 10 above).

Actually in most cases synchronism does not occur, and all experimenters commencing with Mr. Rabut agree in saying that the increments due to the effect of the counterbalance, whilst not being absolutely negligible, are of little importance no matter what the span may be.

* * *

For girders of small span such as the stringers, the natural frequency of which is very high and consequently the critical speed, the effect of the counterbalance weights can be calculated neglecting the vibrations. The value of Q is found and the value of the stresses is calculated on the supposition that the Q effect does not change position and acts suddenly and once only at the middle of the stringer.

In the case of large spans, this calculation gives little in the way of results.

(1) This Q when acting upwards has been found on certain engines in America and England to cause the wheel to lift, the wheel then falling again suddenly on the rail like the blow of a hammer; from this the name of *Hammerblow* has been given to the effect.

There is no doubt that for 3- and 4-cylinder locomotives, on which the reciprocating parts balance themselves to some extent and sometimes almost completely, the Q effect is very small.

In the case of small spans, what must be especially considered is the effect of the vertical centrifugal force, of the rail joints, and of the flats on the tyres, dealt with above under Nos. 3, 5, 13, and 15.

§ 8. — General conclusions.

1. *Effect of the centrifugal force.* — As we have seen above in No. 5, this effect may be as high as 30 to 35 % in the case of short bridges; on the other hand with long bridges it falls to 1 %.

2. *Shock effect* and sudden loading. — We saw in No. 13 that the sudden application of the load made itself more felt on short bridges. We also saw that the shock was above all due to the rail joints and to the flats on wheels and was much more serious in the case of short than long bridges.

3. *Counterbalance effect.* — This effect has been dealt with under No. 20 and is once again of much greater importance in the case of short than of long bridges. — The same as regards flats, see No. 15.

4. *Resonance effect.* — See § 7.

This effect is hardly appreciable in short nor in long bridges.

The most dangerous factors setting up resonance are wheel flats and rail joints.

§ 9. — Dynamic coefficient. — Impact.

21. The theoretical calculations given in § 2 to 5 above all lead to the conclusion that the dynamic effects have an influence which diminishes in proportion as the length of the bridge increases : this conclusion is confirmed by experience.

Theory however, cannot give any formula for this diminution, in other words cannot give the dynamic coefficient (for the definition of this see No. 2 above) : to be able to get this we have to look to experiments, that is to say we have to look for an empirical formula.

Unfortunately this search gives very varying results. For example, for a 30-m. (98 ft. 5 1/8 in.) span, the Belgian formula of the Lower Congo to the Katanga Railway (B. C. K.) gives 0.33, the French formula 0.37, and the American 0.88.

In the case of a 50-m. (164 ft. 1 1/2 in.) span, the B. C. K. Railway formula gives 0.17;

the French formula : 0.26;
the American formula : 0.56.

For a 100-m. (328 ft. 1 in.) span, the coefficient varies from 0.10 (B. C. K. Railway) and 0.35 (American formula).

The formulæ giving the lowest dynamic coefficients are the :

Belgian (B. C. K.) $= \dfrac{10}{10 + L}$

Swedish;
French.

There are some ten different formulæ used by different countries and railways.

It would serve no useful purpose if we gave them as they are only of value for the permanent way and rolling stock with which they were obtained.

It may be said that a low coefficient points to excellent permanent way and equipment.

For the many empirical formulæ for impact and their graphical representation the reader is referred to the *Bulletin of the International Railway Congress Association* of December 1929, pages 3142 and 3143.

§ 10. — Examination of bridges for soundness.

Ultimately metal bridges fall off in soundness perhaps because the E of the metal diminishes and also the I of the main girders, this through rusting which reduces the sections and through the rivets slackening which lessens the closeness of connection between the two flanges.

Tests made from 1919 to 1924 in Russia have amongst other things led to the conclusion that with age trellis girders tend to behave as articulated girders (*Bulletin of the International Railway Congress Association*, December 1926, page 1074).

This showed the necessity for checking over periodically all joints and members of the bridges, and from time to time to test them in order to make sure that their flexibility remained good or in other words had not increased too much.

Nevertheless as Mr. *Fava*, Engineer and Chief Inspector of the Permanent Way of the Italian State Railways, has said, such indications do not enable us to know with certainty the inside state of repair of the metal structure and he recommends recourse to the *vibrator* dealt with in No. 18 above, with a view to arriving at the T″ of the oscillations of the unloaded bridge (1); we saw under No. 7 that its value is expressed by :

$$T'' = 0.634 l^2 \sqrt{\frac{p}{g\,EI}}.$$

If E diminishes or if I diminishes, the T″ increases; consequently T″ enables us to form an idea of the value of EI, and the speed of damping out of T″ is also a valuable indication.

Experience has shown in fact, that T″ increases ultimately which denotes a diminution of EI and an increase of the stresses *for a given load*, as T″ can also be expressed (see No. 12) by :

$$T'' = \frac{l}{5\,550} \sqrt{\frac{R}{h}}$$

R is the stress per unit; it will be seen, therefore, that if T increases, it indicates that R also increases.

As Mr. Fava says, the T″ determined experimentally by means of the vibrator and this at fixed intervals, will supply data which at succeeding intervals of time will make it possible to appreciate if and under what conditions the elasticity of the bridge varies and with it its structural condition.

At the Liége Congress of September 1930, Messrs. A. Ronsse and R. Desprets, Professor at the University of Brussels, presented a very important and valuable paper on *Testing metal bridges for soundness* (*Auscultation des ponts métalliques*).

The *Zeitschrift des Vereines deutscher Ingenieure* of the 17 January 1931 gives a description of a new vibrator intended for use in examining the dynamic properties of bridges and for controlling their condition whilst in service.

The excentricity of the counterbalance weight can be so regulated as to obtain a maximum centrifugal force of 5 000 kgr. (11 023 lb.) and this in three directions perpendicular to one another.

(1) See *Bulletin of the Railway Congress Association*, December 1929, p. 3152.

[621. 33 (.42)]

Main-line railway electrification.

(Editorial, *Engineering*, 1-5-1931.)

In September, 1929, the Minister of Transport appointed a Committee, of which Lord Weir was chairman and Sir Ralph Wedgwood and Sir William McLintock, members, « to examine into the economic and other aspects of the electrification of the railway systems in Great Britain, with particular reference to main line working ». The report (1) of this Committee, which was published by H. M. Stationery Office in April, is an interesting document, the oustanding characteristics of which are enthusiasm and caution. Early in their investigations, the Committee seem to have convinced themselves that the economic possibilities of main-line electrification were encouraging, and to have allowed that conviction to colour their subsequent deliberations. Clearly, however, they have desired to be fair throughout, and in their caution have not, perhaps, given as much weight as they might have done to the fact that the advantages of electrification are not entirely economic. Stated briefly, these conclusions are : That the low price and greater availability of electrical energy, which will result from the national scheme, will favourably affect the economics of railway electrification, that it is essential that the railways should examine new methods of reducing the costs of operation, and that to secure the fullest economic advantage of railway electrification the scheme adopted should cover all lines at present worked by steam, except such branches as detailed examination may show can be economically operated by independent haulage units.

These conclusions are based on a number of estimates, prepared both by consulting engineers and by officials of the railway companies, the Committee confessing that they were entirely unsuccessful in obtaining reliable comparative costs of steam and electric traction from any other source. The first of these estimates concerns the main line of the London and North Eastern Railway between London and Leeds with the branches to Nottingham, Boston and Lincoln, and the lines from Doncaster to March and Peterborough to Grimsby. This system carries both heavy through and light local traffic, and was considered to be fairly typical of British railways as a whole. The track mileage is 1944, and the existing trailing ton-mileage per annum, all of which it was assumed would be hauled electrically, is 6 000 000 000, the traffic density being 4 300 000 trailing ton-miles per running track-mile per annum, compared with an average of 3 000 000 for the whole country. The estimated net capital outlay necessary for the electrification of this system is £8 646 000, assuming that the surrounding lines are also electrified, the annual operating expenses after conversion being £1 634 280 compared with £2 258 910 for steam. The percentage return on the new capital would, therefore, be 7.22 %.

The second scheme covers the main line of the London Midland and Scottish

(1) *Report of the Committee on Main Line Electrification.* 1931. London : H. M. Stationery Office. Price 3 sh. net.]

Railway between Crewe and Carlisle, together with the line from Weaver Junction to Liverpool and the branches to Windermere, Over and Wharton, Garston and Morecambe, but in this case it was assumed that the surrounding lines would still be operated by steam. The track mileage is 843, and the trailing ton-mileage per annum 2 620 000 000, of which 2 225 000 000 were assumed to be worked electrically and 395 000 000 by steam, the traffic density being 4 050 000 trailing ton-miles per mile of running track per annum. The estimated net capital outlay was £5 123 000, and the operating expenses £672 424, compared with £800 190 for steam alone. The percentage return on the fresh capital was, therefore, only 2.5 %, a result which is partly ascribed to the necessity of electrifying a considerable mileage of sidings which would not be fully utilised and partly to the facts that, owing to dual working, the total number of locomotives, steam and electric, could only be reduced from 614 to 599, and that the electric locomotives would not be operating under the most favourable conditions. The net outcome of these two investigations is the, perhaps somewhat sweeping, statement that the only way to obtain the full benefit of railway electrification is by the complete substitution of steam by electricity.

The Committee next turned their attention to discovering how much this complete substitution would cost and what economic and other results would follow in its train. For this purpose they used not only the two investigations we have just analysed, but two other independent surveys, and thus obtained a final estimate covering the entire railway system of the country. This last estimate discloses that wholesale electrification would necessitate a net capital expenditure of £261 000 000, and that, on completion, the annual cost of operating the electrified system would be £32 199 424, compared with £52 604 127 for steam working, giving a difference in favour of the former of £21 757 703. This difference would, however, be reduced to £17 296 703, by the allocation of £4 461 000 to the maintenance and renewal of track equipment, the maintenance and operation of sub-stations and the more rapid depreciation of electric as compared with steam locomotives, but would be increased to £17 550 703 by an item of £254 000, representing additonal revenue for the haulage of coal to power stations. The final result, therefore, gives a return of 6.7 % on the capital expenditure or of about 2 % after the interest charges have been met. « Such a return », runs the report, « taken by itself, would not appear from the business point of view to warrant the adoption of a scheme of such exceptional magnitude. The margin would, in our view, be too narrow for the risks and contingencies involved. »

At first sight this opinion, which surprisingly enough does not appear in the « Summary and Conclusions », makes the Committee's obvious bias in favour of complete electrification unintelligible. It must also be pointed out that the capital costs involve some credit items under the heading of rolling stock on which more detailed information would be interesting, and that the comparison of working costs includes only items directly affected by electrification and ignores altogether such matters as alterations to stations and signalling, to mention only two changes which would be necessary to a greater or less degree. Nothing, moreover, is said about the equipment of goods wagons with continuous brakes and close coupling, although necessary to a greater or less extent if the saving of £2 500 000 on passenger stock, budgetted for on the strength of acceleration of services, is to be secured. It does, however, include a saving of £840 000 on auxiliary power and lighting supplies which it is perhaps hardly fair to credit to electrical operation *per se*. On the other

hand, all the estimates were based on existing traffic statistics, wages bills and costs of materials and energy, and many factors favouring electrification which do not lend themselves to direct monetary assessment, were ignored. These include speedier and more satisfactory service, greater uniformity of speed, increased capacity of terminal stations, the development of air rights, the possibility of avoiding expenditure on bridge renewals and, above all, additional traffic. Admitting that some of these are nebulous, both as regards execution and effect, others cannot be disregarded if a true comparison is to be made. We naturally do not know in what detail the estimates have been worked out, but experience is that actual expenditure usually exceeds the estimates. For instance, while the amount originally allocated for frequency standardisation in the grid scheme was £8 000 000, this has now been increased to £16 000 000, a not unimportant difference, even allowing for increased consumption of electricity over the time the estimate was made. To undertake the scheme as suggested would therefore impose great responsibilities on the railways, though this would not matter were the advantages hypothecated to be achieved. Of that, however, there cannot but be some doubt.

There are certain other aspects of the scheme which require at least passing comment. Under the heading of capital expenditure, credit items of £45 500 000 and £2 500 000 are allowed for locomotives and passenger coaches, respectively, on the grounds that the usual replacements will not be necessary, or that their renewal can be avoided. Without knowing the methods by which these figures were obtained, it is impossible to controvert their accuracy, but it may be suggested that they seem very large. The locomotive figure is approximately the cost of locomotive renewal, with steam traction, over the next twenty years. But even if general electrification were started to-morrow it is certain that expensive steam locomotive renewals would still be necessary for very many years. In a less degree, the same remarks apply to the credit allowed for existing train lighting sets which, it is assumed, would be entirely replaced in twenty years' time.

The greatest saving secured from electric operation falls under the heading of labour costs, the reduction being no less than 53 % on the present wages bill of £ 20 993 425. This is partly due to a reduction in train crews, partly to the acceleration of the trains, and mainly to a decrease in the time spent on locomotive duties. This reduction in personnel will be spread over twenty years, and may be compensated in other directions. The matter is an incidental one, but from the point of view of the prospects of the adoption of the scheme it may be suggested that this condition will not necessarily appeal to a Labour Government. A saving of £6 159 012 is estimated on the cost of locomotive repairs, but as we have already pointed out, this is largely offset by maintenance charges on the tracks, and renewals. Some £883 666 are saved on water, and about the same amount on auxiliary power and lighting supplies.

Technically, the proposals disclose nothing that is novel. « The widespread availability of high-tension electrical energy » was the reason for the appointment of the Committee, and the necessary power is naturally to be obtained from the grid. It is proposed that the Central Electricity Board, which, it is recommended, should be given powers to supply direct, should erect the necessary transmission lines and sub-stations, though the operation of the latter, would be in the hands of the railways. The estimates are based on the assumption that the 1 500-volt overhead direct-current system will be used, and that the price of energy, at the direct-current

'bus-bars, will be 0.475 d. per kilowatt-hour, subject to a coal clause and the payment by the railway companies of the local rates, and providing that the consumption on the completion of the electrification is not less than 6 000 million kilowatt-hours per annum. Considering that this assumes a load factor of 50 %, and that much is made of the benefits that the railway load will confer on the general supply, this is not an exceptionally low figure. Various alternatives to a centralised electric system, such as oil and oil-electric locomotives are mentioned, but are dismissed relatively briefly, though their value for operating branch lines is admitted.

The various features of the scheme having been examined, the important questions naturally arise whether the case for general electrification can thus be admitted without further argument, or whether any alternative is possible. Answers are to be found in the report itself. For though, it is pointed out, an increase in traffic has not been taken into account in framing the estimates, such an increase must tend to raise the relative economy of electrification. This increase, it is considered, could be accelerated in many suburban areas, metropolitan and provincial, by spending £40 000 000 on additional tracks, on the reconstruction of stations, and on remodelling the signalling. This expenditure, which would bring in £ 5 850 000 of extra revenue, or a return of 13 % on the outlay, is, it may be noted, additional to, and not in substitution of, the expenditure which would be necessary under the general scheme on such suburban lines as are not already electrified.

This suggestion and admission seriously undermines the case for general electrification. For, though the Committee protest that it would be uneconomical to electrify the suburban areas first and then to link up the main lines between them, for the reason that this would mean dual working, this does not necessarily follow. It would be possible, as is already being done in France and the United States, to operate *all* trains in a given suburban area electrically and to change over to steam at places where the traffic density fell below a certain critical figure. As conditions changed it is conceivable that these places would become more and more remote from the towns, and that by a process of natural development the entire system would come to be operated electrically. Such a procedure would have the further advantages that it would enable those lines which are obviously best adapted for electric working to be converted first, besides allowing the estimates for the whole scheme to be checked by practical experience. It would be much wiser to adopt this policy rather than to commit the nation and the railways to a grandiose conception, the implications of which it is difficult to predict, even if they are not altogether incalculable.

We are supported in this opinion when we go outside the Committee's terms of reference and examine the finance of the scheme from another point of view. As we have said, the conversion proper is estimated to cost £261 000 000. In addition, the Central Electricity Board will require £80 000 000 for transmission lines and sub-stations, and £45 000 000 is earmarked for « intensifying » the suburban systems. Where is this £385 000 000 to come from? The railway companies, obviously, cannot raise it without assistance, and though a Government guarantee would doubtless be forthcoming, it is not improbable that this official billbacking would have a harmful effect on those conversion schemes of a different kind which are now so dear to every Chancellor's heart. But, even assuming we are over-pessimistic on this score, and that the money can be raised without disturbing the money market, the direct

benefits which would accrue to the railway companies are not such as to cause them to follow up the proposals with any enthusiasm. They may secure indirect advantages from being placed in time in a stronger position to meet motor competition, but it is difficult to see, on the Committee's figures, that they would benefit to any very material extent. From the point of view of manufacturing industry, however, the matter will appear in another light. As the Committee point out, substantially all the expenditure would be ultimately distributed through the country in the form of wages and the conditions created would enable electrical manufacturers better to secure their share of the world's markets. It will be a pity, however, if this point of view only were to appeal to the railway companies. The report is worthy of very careful examination by competent railway officials, who should, if possible, be allowed access to the detailed figures on which the estimates were based. From this they should be able to gain information of a character different from that which has hitherto been obtainable on this difficult subject, and should thereby be assisted to tackle a problem to which they must inevitably give close consideration in the near future, with a fair measure of hope that some practical solution will emerge.

[313 : 625 .143.3]

Statistics of rail breakages for the year 1930.

(Continued.)

We continue hereafter the publication, in the new form adopted, of the statistics of rail breakages which occurred in 1930 on the systems of our member Administrations.

The first part of these statistics appeared in the November 1931 number, pp. 956 to 998.

In the tables hereafter, and unless stated otherwise :

Light rails applies to rails of a weight less than 85 lb. per yard (42.5 kgr. per metre).

Medium rails, to rails of 85 to 105 lb. per yard (42.5 to 52.5 kgr. per metre).

Heavy rails, to those weighing 106 lb. per yard (53 kgr. per metre) or over.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
GREAT BRITAIN AND NORTH OF IRELAND. Great Western Railway.																	Miles.		English tons.
A. Rails outside tunnels *Light* .	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	1 016	1.23	16
A. Rails outside tunnels *Medium* .	...	...	...	1	...	...	2	...	...	3	...	...	5	...	...	11	5 290	1.30	22.5
Total . . .	...	...	...	1	..	...	2	...	...	3	...	...	7	...	...	13	6 306	1.28	
B. Rails in tunnels *Light* .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
B. Rails in tunnels *Medium*	...	...	...	2	...	...	...	...	...	...	...	..	...	...	...	2	...	...	22.5
Total . . .	...	...	...	2	...	...	...	...	..	...	...	...	...	...	...	2	...	...	
C. The whole of A and B *Light* .	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	1 016	1.23	16
C. The whole of A and B *Medium* .	...	...	...	3	...	...	2	...	...	3	...	...	5	...	...	13	5 290	1.53	22.5
Total . . .	...	...	...	3	...	...	2	...	...	3	...	...	7	...	...	15	6 306	1.48	

Number of train-miles: 64 781 728.

Number of fractures { total: 15. per 10 000 000 tr.-km. or 6 250 000 train-miles: 1.447.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . . .	1 = 50 %	1 = 50 %	1	1	...	2	...
D. *Medium rails* . .	7 = 54 %	6 = 46 %	10	3	...	1	8
		Total . . .	11	4	...	3	8

		Light rails.	*Medium rails.*
E. a) New clean fractures	with internal transverse fissure	...	1
	without internal transverse fissure	2	12
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	1
	in the head	...	6
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	...
d) Number of pieces rails are broken into.		Two or more	Two or more

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
London Midland and Scottish Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels *Light*	...	22	...	...	63	...	...	56	...	...	74	...	2	771	1	2	986	1	20.9
A. Rails outside tunnels *Medium*	11	2 437	2	11	2 583	2	10	1 555	3	8	1 667	3	21	3 736	3	61	11 978	3	22
Total	11	2 459	2.7	11	2 646	2.0	10	1 611	3.9	8	1 741	2.9	23	4 507	3.2	63	12 964	3.02	
B. Rails in tunnels *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
B. Rails in tunnels *Medium*	...	108	...	1	89	...	...	26	...	...	15	...	...	2	...	1	240	3	22
Total	...	108	...	1	89	...	...	26	...	...	15	...	...	2	...	1	240	3	
C. The whole of A and B *Light*	...	22	...	...	63	...	...	56	...	...	74	...	2	771	1	2	986	1	...
C. The whole of A and B *Medium*	11	2 545	2	12	2 672	2	10	1 581	3	8	1 687	3	21	3 738	3	62	12 218	3	...
Total	11	2 567	2.7	12	2 735	2.7	10	1 637	3.8	8	1 761	2.8	23	4 509	3.2	61	13 204	3.01	

Number of train-miles: 149 584 597.

Number of English ton-miles: 6 742 000 000.

Number of fractures { total: 64. per 10 000 000 tr.-km. or 6 250 000 train-miles: 2. per 1 billion tkm. or 612 000 000 ton-miles: 5.

	Percentage of fractures in the part: covered by the fishplates	Percentage of fractures in the part: clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	on curves of ≤ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	on a rising or falling gradient: > 10 mm. per m. (1 in 100)
D. *Light rails*	...	100	1	1	...	...	2
D. *Medium rails*	17.8	82.2	47	9	6	35	27
		Total	48	10	6	35	29

E.		*Light rails*	*Medium rails.*
a) New clean fractures	with internal transverse fissure	...	...
	without internal transverse fissure	1	53
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	4
	in the head	1	4
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	1
d) Number of pieces rails are broken into		2 rails in 2 pieces.	47 rails in 2 pieces. 8 rails in 3 pieces. 5 rails in 4 pieces. 1 rail in 5 pieces. 1 rail with portion of head broken away.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
London and North Eastern Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A Rails outside tunnels *Light* .	1	12.34	50.66	...	34.72	...	...	24.04	...	...	82.64	...	3	1 497.42	1.25	4	1 651.16	1.51	20
Medium .	7	1 611.60	2.71	8	1 349.68	3.70	5	1 127.73	2.77	12	1 541.17	4.57	11	3 160.45	2.18	43	8 790.30	3.06	22.5
Total . . .	8	1 623.60	3.08	8	1 384.40	3.61	5	1 151.77	2.71	12	1 623.81	4.62	14	4 657.87	1.88	47	10 441.46	2.81	
B Rails in tunnels *Light* .	...	...	...	...	0.44	...	...	0.07	...	...	0.07	...	...	2.04	...	...	2.62	...	20
Medium .	...	60.17	...	...	30.65	...	1	44.39	14.08	...	3.59	...	...	1.56	...	1	103.35	6.05	22.5
Total . . .	...	60.17	...	...	31.09	...	1	44.46	14.00	...	3.66	...	...	3.60	...	1	105 97	5.89	
C. The whole of A and B *Light* .	1	12.34	50.66	...	35.16	...	...	24.11	...	...	82.71	...	3	1 499.46	1.25	4	1 653.78	1.51	...
Medium .	7	1 671.43	2.62	8	1 380.33	3.62	6	1 135.12	3.30	12	1 544.76	4.86	11	3 162.01	2.17	44	3 893.65	3.09	...
Total . . .	8	1 683.77	2.97	8	1 415.49	3.53	6	1 159.23	3.23	12	1 627.47	4.61	14	4 661.47	1.87	48	10 547.43	2.84	

Number of train-miles : 101 407 885.

Number of English ton-miles : 6 144 061 399.

Number of fractures { total : 48.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 2.96.
per 1 billion tkm. or 612 000 000 English ton-miles : 4.78.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . . .	25 %	75 %	3	1	...	1	1
Medium rails.	11.36 %	88.64 %	33	10	1	3	29
		Total . . .	36	11	1	4	30
	Miles of single track of each class . . .		9 397	1 150		569	1 352

		Light rails.	*Medium rails.*
E. — *a)* New clean fractures	with internal transverse fissure . . .	1	6
	without internal transverse fissure . . .	...	31
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head . . .	in the foot . . .	...	...
	in the head . . .	...	1
	both in the head and the foot . . .	...	8
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web . . .	...	1
d) Number of pieces rails are broken into .	. . .	2	2 and more.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Southern Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels *Light*	...	...	...	...	...	...	...	...	...	...	...	...	2	123	10.16	2	123	10.16	...
Medium	1	811	0.77	2	880	1.42	3	380	4.93	4	472	5.30	2	1 243	1.01	12	3 786	1.98	21
Total	1	811	0.77	2	880	1.42	3	380	4.93	4	472	5.30	4	1 366	1.83	14	3 909	2.24	
B. Rails in tunnels *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	0.5	...	...	0.5	...	...
Medium	...	47	...	...	27	...	...	4	...	...	2	...	...	5	...	...	85	...	...
Total	...	47	...	...	27	...	...	4	...	...	2	...	...	5.5	...	...	85.5	...	
C. The whole of A and B *Light*	...	...	...	...	...	...	...	...	...	...	...	...	2	123.5	10.12	2	123.5	10.12	...
Medium	1	858	0.73	2	907	1.38	3	384	4.88	4	474	5.27	2	1 248	1.00	12	3 871	1.94	...
Total	1	858	0.73	2	907	1.38	3	384	4.88	4	474	5.27	4	1 371.5	1.82	14	3 994.5	2.19	

Number of train-miles: 60 048 575.

Number of fractures { total: 14.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 1.46.

	Percentage of fractures in the part covered by the fishplates	Percentage of fractures in the part clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	...	2 = 14.3 %	2	...		2	...
Medium rails	4 = 28.6 %	8 = 57.1 %	9	3		12	...
Total			11	3		14	...

		Light rails.	*Medium rails*
E. a) New clean fractures	with internal transverse fissure	...	...
	without internal transverse fissure	2	6
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	...
	in the head	...	4
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	2
d) Number of pieces rails are broken into	Two	2	8
	Three	...	3
	Four	...	1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Metropolitan Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		
Medium rails	2	31.21	...	3	14.79	...	1	8.39	...	...	11.96	...	...	8.34	...	6	74.69	...	*

* Electric locomotives: 14.5 tons; steam locomotives: 19.5 tons.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Metropolitan District Railway (D. R.) & London Underground Tube Railways (T. R.).		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Medium* D.R.	...	5.7	...	...	15.8	...	...	12.0	...	...	10.0	...	...	...	...	...	43.5	...	District, Ry.: 11.25 Tube Rys: 11
A. Rails outside tunnels. *Medium* T.R.	...	*2.0*	...	...	*9.0*	...	...	*0.5*	...	...	...	...	...	*1.7*	...	...	*13.2*	...	
B. Rails in tunnels. *Medium* D.R.	...	6.8	...	...	4.2	...	...	...	...	...	...	...	...	...	...	...	11.0	...	
B. Rails in tunnels. *Medium* T.R.	...	*41.0*	...	...	*9.0*	...	...	*5.5*	...	...	*5.0*	...	*2*	*31.0*	*40*	*2*	*91.5*	*13.6*	
C. The whole of A and B. *Medium* D.R.	...	12.5	...	...	20.0	...	...	12.0	...	...	10.0	...	...	...	...	...	54.5	...	
C. The whole of A and B. *Medium* T.R.	...	*43.0*	...	...	*18.0*	...	...	*6.0*	...	...	*5.0*	...	*2*	*32.7*	*38*	*2*	*104.7*	*12.0*	

Number of train-miles, District Railway: 4 750 000.

Number of English ton-miles, District Railway: 730 000 000.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Medium rails* T. R.	1 = 50 %	1 = 50 %	2	...	...	1 (level)	1 (1 in 85-rising)
		Total. . .	2	...	...	1	1
		Miles of single track of each class . . . . D. R.	26.5	28.0		46.4	8.1
		T. R.	*60.0*	*44.7*		*63.1*	*41.6*

E. Particulars of the fractures. — *Tube Railways*: 2 breakages { 1 breakage due to electrical burn in foot.
1 — piece broken out of end due to additional holes and bad spacing of same.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
London Midland and Scottish Railway (Northern Counties, Committee), Ireland.					Miles.									Miles.			Miles.		English to s.
Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	12	212	35	12	212	35	17.75
Rails outside tunnels. *Medium.*	...	...	...	1	87	7	...	...	...	...	...	...	...	...	...	1	87	7	
Total . . .	...	...	...	1	87	7	...	...	...	...	...	...	12	212	35	13	299	27	

Number of train-miles: 1 622 110.

Number of fractures { total: 13.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 50.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . . .	11	1	...	...	...	...	...
D. *Medium rails* . .	1	...	...	...	...	...	...

Midland and Great Northern Railways, Joint Committee.
County Donegal Railways, Joint Committee.
Great Central and Midland, Joint Committee.
} No rail breakages in 1930.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS. Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
INDIA, DOMINIONS, PROTECTORATES & COLONIES. AFRICA.																			
Gold Coast Railway.	No fractures of rails in 1930.																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Kenya and Uganda Railways & Harbours.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Rails outside tunnels { *Light.*	...	156	...	...	656	...	...	...	...	...	158	...	...	...	...	11	970	8.23	10.5

Number of train-miles : 3 653 000.

Number of English ton-miles · 368 950 000.

Number of fractures { total : 11. per 10 000 000 tr.-km. or 6 250 000 train-miles : 18.7. per 1 billion tkm. or 612 000 000 English ton-miles : 18.2.

	Percentage of fractures in the part covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	...	11	8	2	1	6	5
	Total.		8	2	1	6	5
	Miles of single track of each class		No record kept.				

		Light rails.
E.	*a*) New clean fractures { with internal transverse fissure	...
	without internal transverse fissure	11
	d) Number of pieces rails are broken into	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	SECTION OF LINE.	Length of section.	NUMBER OF FRACTURES AND PARTICULARS OF TRAC[K] — AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 year[s]. Number of fractures.	More than 20 year[s]. Length of single track of this class.	More than 20 year[s]. Number of fractures per 1 000 km.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Beira and Mashonaland and Rhodesia Railways.		Miles.		Miles.			Miles.						Miles.			Miles.	
	Beira-Villa Machado. . .	61	...	...		...	...	...	...	...	...	...	...		...	61	
	Villa Machado-Umtali . .	143	...	98 1/2		2	25	...	...	...	...	...	...		...	19 1/2	
	Umtali-Salisbury.	170	1	77 3/4		...	...	...	...	...	...	...	...		2	92 1/4	
	Salisbury-Bulawayo . . .	298	1	52 3/4		...	...	...	...	...	...	...	...		15	245 1/4	
	Bulawayo-Livingstone. .	288	...	49 3/4		2	80	...	...	...	...	...	...		13	158 1/4	
	Livingstone-Broken-Hill.	368	...	48		...	...	...	...	...	...	...	...		11	320	
	Broken Hill-Congo Border	132	2	41		...	...	...	...	...	...	2	91		...	...	
	Selukwe Branch (S. H. Rail).	23 1/4	...	...		...	...	...	...	...	...	...	...		2	23 1/4	
	West Nicholson Branch .	102 3/4	...	...		...	...	...	...	...	...	...	...		...	102 3/4	
Light rails :	Lomagundi Branch . .	83	...	...	Not expressed.	...	...	...	...	...	...	...	...	Not expressed.	2	83	Expressed in total.
	Lomagundi Branch — Extension ; Sinoia-Zawi.	21	...	...		...	...	...	...	...	...	...	...		...	21	
	Umvukwes Branch-Maryland Kildonan.	24 1/4	...	...		...	...	...	...	...	...	...	...		...	24 1/4	
	Blinkwater Branch. . . .	123	...	...		...	...	...	..	...	...	...	123		...	...	
	Mazoe Branch	73	...	...		...	...	...	...	...	...	1	73		...	...	
	Shabani Branch	63	...	63		...	...	...	...	...	...	...	...		...	...	
	Luanshya Branch (S. H. Rail).	23 3/4	...	...		...	...	...	...	...	...	...	...		..	23 3/4	
	N'kana Branch (S. H. Rail)	41 1/4	...	...		...	...	...	...	...	...	...	...		2	41 1/4	
	Do. — Extension : N'Kana-Nchanga.	Under constr.	..	...		...	...	...	...	...	...	...	...		...	...	
	Total. .	2038 1/4	4	430 3/4	...	4	105	...	...	...	...	3	287	...	45	1215 1/2	23.

Number of train-miles : 5 337 912. — Total number of fractures : 56.

Note : Trucks with axle loads of 13 tons 18 cwt. w

ND RAILWAY.			REMARKS.	Classification according to part II of the suggestions adopted at the General Meeting of the London Congress in 1925.					
				A Percentage of fractures in respective portions of the rails covered by and clear of the fishplates.		B Percentage of fractures according to the appearance of the fracture :			
Train-miles per section.	Maximum axle load (engines).	Maximum speed of trains permitted.		a) Percentage, covered by fishplates.	b) Percentage, clear of fishplates.	a) Fresh and clean fracture through whole of rail section.	b) Fractures part of which is old and much rusted, extending to outer face of foot or head of rail.	c) Fractures with much rusted portions not extending to outer face of foot or head of rail.	d) Number of pieces into which rail is broken.
19	20	21	22	23	24	25	26	27	28
	Tons. Cwt.	Miles per hour.							
152 382	9—12	30	...	...	...	...	...	...	...
422 592	13—10	30	...	50.00	50.00	50.00	50.00	...	2 pieces.
637 559	13—10	35	...	66.66	33.33	33.33	33 33	33.33	2 pieces.
924 840	13—10	35	...	43.75	56.25	62.50	37.50	...	2 p. : 12 3 p. : 2 4 p. : 1
967 060	13—10	35	...	80.00	20.00	40.00	46.67	13.33	2 pieces.
1 420 517	13—10	35	...	63.63	36.37	63.63	27.27	9.10	2 p. : 9 3 p. : 2
487 812	13—10	35	...	100.00	...	75.00	25.00	...	2 p. : 3 3 p. : 1
24 464	12- 18	30	...	50.00	50.00	50.00	50.00	...	2 pieces.
94 175	12-18	30	...	...	...	...	...	...	...
53 160	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
1 200	12—18	20	...	...	...		...	..	...
61 953	12—18	30	...	...	...		...	...	...
44 171	12—18	30	...	100.00	...	...	100.00	...	2 pieces.
19 348	12—18	25	...	...	...	...	...	...	...
12 286	13—10	30	...	...	...	...	...	...	...
14 391	13 - 10	30	...	100.00	...	50.00	50.00	...	2 pieces.
...	...	...	...	...	...	...	...	...	...
5 337 912	...	...	...	66.07	33.93	53.57	39.28	7.15	...

Number of fractures per 10 000 000 train-kilometres or 6 250 000 train-miles : not expressed.

ded to full capacity run over all sections of the line.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Nigerian Railway.																			
Rails outside tunnels. *Light.*	...	...	...	6	...	...	...	...	...	7	...	...	4	...	...	17	...	...	...

Number of train-miles: 3 647 402.

Number of English ton-miles: 1 058 822 646.

Number of fractures: total: 17. per 10 000 000 tr.-km. or 6 250 000 train-miles: 29. per 1 billion tkm. or 612 000 000 English ton-miles: 9.82.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	4	13	11	2	4	...	...

		Light rails.
E. *a)* New clean fractures	with internal transverse fissure	3
	without internal transverse fissure	7
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...
	in the head	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	1
d) Number of pieces rails are broken into		11 rails broken through — 6 rails partly fractured.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Length of single track.	Age of rails : Less than 5 years		5 to 10 years		10 to 15 years.		15 to 20 years.		More than 20 years.		Age unknown. (Roll marks obliterated.)		Maximum axle load.
		Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
South African Railways and Harbours (*).	Miles.													Engl. tons.
Light rail : 35-46 1/4 lb.	2 719	...	...	2	0.46	2	0.46	37	8.52	22	5.06	10	2.30	10.5
Medium rails : 60 61 lb.	6 398	16	1.56	9	0.88	...	...	22	2.15	86	8.40	37	3.61	13.5
Heavy rails : 75-85 lb.	4 276	43	6.29	20	2.92	27	3.95	134	19.58	24	3.51	55	8.04	18.5
Total	13 393	59	2.75	31	1.45	29	1.35	193	9.01	132	6.16	102	4.76	...

(*) Year ending 31-12-1930.

Number of fractures per 6 250 000 train-miles : 73.84.

Total number of fractures of all classes of rails : 546.

Number of train-miles for year ended : 31-12-1930 : 46 216 167.

Note. — The above fractures include those occurring in sidings as well as in running tracks.

The table covers *all* instances of rails removed from the track on account of fractures even though the rails may not have been completely broken into two or more portions, i. e. the fractures enumerated include rails which have cracked and have been removed in the interest of safety.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Sudan Government Railways and Steamers. (*)		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Tonnes.
Light rails 50 lb. . .	...	274	...	...	216.2	...	...	...	...	...	9.3	...	14	795	10.93	14	1 294.5	6.71	11.6
Light rails 75 lb. . .	...	...	...	...	59.7	...	...	13.7	...	...	296.4	...	8	304.5	16.32	8	674.3	7.37	16
Total . . .	...	274	...	...	275.9	...	...	13.7	...	...	305.7	...	22	1 099.5	12.43	22	1 968.8	6.94	

Number of train-miles: 2 177 855.

Number of English ton-miles: 894 384 020.

Number of fractures { total: 22.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 62.77.
per 1 billion tkm. or 612 000 000 English ton-miles: 15.04.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *50-lb. rails* . . .	1	13	14	...	...	14	...
D. *75-lb. rails* . . .	...	8	8	...	...	8	...
		Total. . .	22	...	...	22	...

	50-lb. rails	*75-lb. rails*
E. a) New clean fractures { with internal transverse fissure . . .	1	...
without internal transverse fissure . . .	7	4
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the foot . . .	1	...
in the head . . .	...	1

(*) Excluding sidings.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
AUSTRALASIA. **New South Wales Government Railways.**		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		
Rails outside tunnels — *Light.*	3	5 952.453	0.315	...	5,952.453	...	3	5 952.453	0.315	9	5 952.453	0.945	49	5 952.453	5.125	64	5 952.453	6.718	...
Rails outside tunnels — *Medium.*	7	743.175	5.887	1	743 175	0.841	1	743.975	0.841	...	743.175	...	2	743.175	1.682	11	743.175	9.251	...
Total . .	10	6 695.628	0.932	1	6 695.628	0.093	4	6 695.628	0.372	9	6 695.628	0.839	51	6 695.628	4.753	75	6 695.628	6.99	...

Number of train-miles: 26 713 951.
Number of English ton-miles: 8 085 828 242.

Number of fractures { total: 75.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 17.56.
per 1 billion tkm. or 612 000 000 English ton-miles: 5.677.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	12. 5 %	87.5 %	45	30 (higher or lower rail not recorded).			
D. *Medium rails*	63.63 %	36.36 %				40	35
		Total . . .	45			40	35
	Miles of single track of each class . . .		5 309.466	1 386.162		...	...

E.		Light rails.	Medium rails.
a) New clean fractures	with internal transverse fissure . . .	15	3
	without internal transverse fissure . . .	49	8
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head . . .	in the head . . .	30	
	in the foot . . .	24	
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web . . .	21	
d) Number of pieces rails are broken into . . .		58 in 2 pieces, 12 in 3 pieces, 4 in 4 pieces, 1 in 5 pieces.	

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
New Zealand Government Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels *Light.*	...	326.5	...	4	427	5.85	1	139.5	4.48	15	696	13.47	62	1 792	21.6	82	3 381	13.45	14
A. Rails outside tunnels *Medium.*	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	3	...	
Total	...	326.5	...	4	430	5.82	1	139.5	4.48	15	696	13.47	62	1 792	21.6	82	3 384	13.45	
B. Rails in tunnels *Light.*	...	7.5	...	...	4	...	...	2.5	...	1	5	125	1	6	104.1	2	25	50	14
B. Rails in tunnels *Medium.*	...	...	...	2	7	178	...	...	...	...	...	...	...	...	...	2	7	178.6	
Total	...	7.5	...	2	11	113.5	...	2.5	...	1	5	125	1	6	104.1	4	32	78	
C. The whole of A and B *Light.*	...	331	...	4	431	5.8	1	142	4.4	16	701	14.25	63	1 798	21.8	84	3 406	15.35	14
C. The whole of A and B *Medium.*	...	...	...	2	10	125	...	...	...	...	...	...	...	...	...	2	10	125	
Total	...	334	...	6	441	8.5	1	142	4.4	16	701	14.25	63	1 798	21.8	86	3 416	15.7	

Number of train-miles: 11 946 000.

Number of English ton-miles: 2 382 894 489.

Number of fractures: total: 86. per 10 000 000 tr.-km. or 6 250 000 train-miles: 45. per 1 billion tkm. or 612 000 000 English ton-miles: 22.0.

	Percentage of fractures in the part covered by the fishplates	Percentage of fractures in the part clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D *Light rails*	59.3 %	38.4 %	51	22	11	(Two-way traffic)	...
D *Medium rails*	2.3 %	...	2	...	...		
		Total	53	22	11	...	...
	Miles of single track of each class		2 660	756		...	...

		Light rails.	*Medium rails.*
E. a) New clean fractures	with internal transverse fissure	2	...
	without internal transverse fissure	6	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	30	1
	in the head	35	1
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	11	...
d) Number of pieces rails are broken into		2, 3, 4, 5.	

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CANADA. Canadian Pacific Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Pounds
A. Rails outside tunnels — *Light.*	No record kept.																		
A. Rails outside tunnels — *Medium.*	26	2 229	7	134	2 156	38	...	...	...	...	...	...	...	...	...	160	4 385	23	
A. Rails outside tunnels — *Heavy*	No rail of these weights.																		
B. Rails in tunnels — *Light.*	No record kept.																		
B. Rails in tunnels — *Medium.*	...	18	...	...	6	...	...	...	...	...	...	...	...	...	...	...	14	...	
B. Rails in tunnels — *Heavy*	No rail of these weights.																		
C. The whole of A and B — *Light.*	No record kept.																		
C. The whole of A and B — *Medium.*	26	2 237	7	134	2 162	38	...	...	...	...	...	...	...	...	...	160	4 399	23	63 000
C. The whole of A and B — *Heavy*	No rail of these weights.																		

E. — a) New clean fractures	*Light rails.*	*Medium rails.*	*Heavy rails.*
with internal transverse fissure	...	88	No rail
without internal transverse fissure	No record kept.	72	of these weights.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ASIA. CEYLON. Ceylon Government Railway.		Miles.			Miles.			Miles.			Miles.			Miles			Miles.		Engl. tons.
A. Rails outside tunnels. *Light.*	...	213.4	...	1	81.9	7.6	...	42.1	...	1	177.4	3.5	7	272.5	16	9	787.3	7.14	14
Medium.	...	71.6	...	...	91.1	...	...	25.3	...	...	14 0	...	1	28.6	22	1	230.6	2.71	15.5
Total . . .	...	285.0	...	1	173.0	3.6	...	67.4	...	1	191 4	3.3	8	301.1	16.6	10	1 017.9	6.14	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Medium.	...	1.0	...	...	1.2	...	...	0.8	...	...	0.3	...	...	0.4	...	...	3.7	...	...
Total . . .	...	1.0	...	...	1.2	...	...	0.8	...	...	0.3	...	...	0.4	...	...	3.7	...	
C. The whole of A and B. *Light.*	...	213.4	...	1	81.9	7.6	...	42.1	...	1	177.4	3.5	7	272.5	16	9	787.3	7.14	14
Medium.	...	72.6	...	...	92.3	...	...	26.1	...	...	14.3	...	1	29.0	22	1	234.3	2.76	15.5
Total . . .	...	286.0	...	1	174.2	3.59	...	68.2	...	1	191.7	3.26	8	301.5	16.58	10	1 021.6	6.12	

Number of train-miles : 4 883 676.
Number of English ton-miles : not available.

Number of fractures { total : 10. per 10 000 000 tr.-km. or 6 250 000 train-miles : 12.8.

	Percentage of fractures in the part covered by the fishplates	Percentage of fractures in the part clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails* . .	20 %	70 %	2	2	5	3	6
Medium rails .	...	10 %	...	1	...	...	1
Heavy rails . .	...	...	...	...	...	...	...
		Total . . .	2	3	5	3	7

		Light rails.	*Medium rails.*
E. a) New clean fractures	with internal transverse fissure	...	...
	without internal transverse fissure	...	1
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	3	...
	in the head	4	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	2	...
d) Number of pieces rails are broken into		...	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
INDIA. Bengal Nagpur Railway.																			
Light rails	...	84.92	...	1	61.24	10.20	...	2.31	...	8	296.47	16.87	9	1 001.51	5.62	...	...	...	21.5
Medium rails	5	616.88	5.07	...	66.19	...	2	11.39	109.75	8	17.81	280.74	8	1 288.73	3.88	...	—	...	
Total	5	701.80	4.45	1	127.43	4.90	2	13.70	91.24	16	314.28	31.82	17	2 290.24	4.64	...	...	...	...

Number of train-miles : 14 210 294.
Total number of fractures : 41.

Number of fractures per 10 000 000 tr.-km. or 6 250 000 train-miles : 18.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bombay, Baroda and Central India Railway (*)		Miles.			Miles.			Miles			Miles.			Miles.			Miles.		English tons.
I. — 5 ft.-6 in. gauge.																			
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17.75
Medium	...	...	...	...	...	...	1	...	...	1	...	...	8	...	...	10	1 294.174	4.829	19.70
Total	...	...	...	...	...	...	1	...	...	1	...	...	8	...	...	10	1 294.73	4.829	
II. — Metre gauge.																			
A. Rails outside tunnels. *Light.*	...	...	...	...	...	...	1	...	...	1	...	...	31	...	...	33	2 943.646	...	(**)
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.28	...	(***)
Total	...	...	...	...	...	...	1	...	...	1	...	...	31	...	...	33	2 943.926	...	

Number of train-miles { I : 8 671 841. II : 10 037 000.

Number of English ton-miles { I : 139 711 000. II : 1 813 656 000.

Number of fractures { total : I : 10; II : 33. per 10 000 000 tr.-km. or 6 250 000 train-miles : I : 7.21; II : 20.54. per 1 billion tkm. or 612 000 000 English ton-miles : I : 43.77; II : 11.14.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails,* II	3.03	96.97	32	...	1	1	32
Medium rails, I	...	100 %	100 %	...	...	...	...
Miles of single track of each class (II)			2 708.673	235.253		23.268	2 920.658

		Medium rails.	
E. a) New clean fractures { with internal transverse fissure	Broad gauge lines.	1	No data as regards E a), b), c), d) for the metre-gauge system.
without internal transverse fissure		9	
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the foot		2	
in the head		7	
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head { in the web		1	
d) Number of pieces rails are broken into		2	

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Burma Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Engl tons.
Rails outside tunnels. } *Light* .	...	...	...	1	87	...	1	1 080	0.5787	1	723	0.8645	2	336	3.7202	5	2 226	1.4038	10

Number of train-miles : 8 506 754.
Number of English ton-miles : 2 670 491 072.

Number of fractures { total : 5. per 10 000 000 tr.-km. or 6 250 000 train-miles : 3.6736. per 1 billion tkm. or 612 000 000 English ton-miles : 1.1459.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates	clear of the fishplates	on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails* .	20 %	80 %	5	...	...	5	...

	Light rails.
E. *a)* New clean fractures { with internal transverse fissure	1
without internal transverse fissure	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head . . . . { in the foot	3
in the head	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . . . { in the web	1
d) Number of pieces rails are broken into	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS. Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Great Indian Peninsula Railway.		(*)			(*)			(*)			(*)			(*)			Miles.		
A. Rails outside tunnels. *Light.*	1	...	...	2	...	...	2	...	...	1	...	...	42	...	...	48	2 925	10.25	(**)
A. Rails outside tunnels. *Medium.*	1	...	...	5	...	...	...	...	...	1	...	...	5	...	...	12	1 221	6.14	
Total . . .	2	...	...	7	...	...	2	...	...	2	...	...	47	...	...	60	4 146	9.04	

Number of train-miles : 30 723 729.

Number of fractures { total : 60.
per 10 000 000 tr.-km. or 6 250 000 train-miles · 12.21.

	Percentage of fractures in the part: covered by the fishplates	Percentage of fractures in the part: clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails.* . .	3	4	6	1	...	...	...
D. *Medium rails.* .	...	6	6	...	...	...	...

E. *a*), *b*) and *c*) : No records.

d) Number of pieces rails are broken into : two.

Light rails. Rail section.	*Light rails.* Miles of single track.	*Medium rails.* Rail section.	*Medium rails.* Miles of single track.	*Heavy rails.* Rail section.	*Heavy rails.* Miles of single track.
69 lb. — D. H.	470.00	85 lb. — B. H.	121.00	115 lb. — F. F.	4.22
75 lb. — F. F.	370.00	100 lb. — B. H.	1 100.00	...	...
80 lb. — F. F.	758.00	...	...	...	...
82 lb. — B. H.	1 327.00	...	...	...	...

(*) It is not possible to give the length of single track according to age as no record exists.
(**) 69-lb. rails = 15.5 tons. — 75-lb. rails = 17 tons. — 80-lb. rails = 18.5 tons. — 82-lb. rails = 19.33 tons. — 85-lb. rails = 20.5 tons. — 100-lb. rails = 25 tons. —115-lb. rails = 28 tons.
Detailed reports of breakages of rails are not received in all cases for rails over 10 years in the road, hence the difference between A and D.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
North Western Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels *Light* . .	...	389	...	...	409.9	...	1	270.4	2.32	3	680.7	2.75	33	3 185	6.48	37	4 935	4.69	17.5
Medium .	4	609.7	4.1	9	545.3	10.3	2	456.9	2.73	5	577.1	5.42	4	651.1	3 82	24	2 840.1	5.28	22.5
Total . . .	4	998.7	...	9	955.2	...	3	727.3	...	8	1 257.8	...	37	3 836.1	...	61	7 775.1	...	...
B. Rails in tunnels *Light* . .	...	...	...	...	...	...	...	0.25	...	...	1.75	..	...	9.39	...	...	11.39	...	17.5
Medium .	...	...	...	...	4.68	...	...	...	...	...	0 38	...	...	0 58	...	...	5 64	...	22.5
Total . . .	...	...	...	...	4.68	...	...	0.25	...	...	2.13	...	...	9.97	...	...	17 03	...	...
C. The whole of A and B *Light* . .		389	...	...	409.9	...	1	270.65	2.3	3	682.45	2.74	33	3 194.39	6.45	37	4 946.39	4.68	17.5
Medium .	4	609.7	4.1	9	549.98	10.2	2	456.9	2.73	5	577.48	5.42	4	651.68	3.82	24	2 845.74	5.27	22.5
Total . . .	4	998.7	...	9	959.88	...	3	727.55	...	8	1 259.93	...	37	3 846.07	...	61	7 792.13	...	...

Number of train-miles: 27 189 295.

Number of English ton-miles: 2 745 012 219.

Number of fractures { total: 61. per 10 000 000 tr.-km. or 6 250 000 train-miles: 14.02. per 1 billion tkm. or 612 000 000 ton-miles: 13.6.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates	clear of the fishplates	on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails* . . .	...	100 %	34	3	...	7	30
D. *Medium rails* . .	4.2 %	95.8 %	23	...	1	...	24
		Total . . .	57	3	1	7	54
		Miles of single track of each class.	7 243.41	548.72		878.04	6 914.09

E		*Light rails.*	*Medium rails.*
a) New clean fractures	with internal transverse fissure	...	1
	without internal transverse fissure	34	22
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	15	6
	in the head	...	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web	1	1
d) Number of pieces rails are broken into		2 pieces: 59. 2 rails cracked.	

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IRELAND. (Irish Free State) Great Southern Railways.																			English tons.
Rails outside tunnels. *Medium.*	...	...	...	...	...	...	...	...	...	...	...	...	24	...	...	24	...	...	16
Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	...	...	18.5
Total . . .	...	...	...	...	...	...	...	...	...	...	...	...	26	...	...	26	...	...	

Number of train-miles: 9 592 493.

Number of fractures { total: 26. per 10 000 000 tr.-km. or 6 250 000 train-miles: 16.94.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . .	19.23	73.07	14	3	7	6	13
D. *Medium rails* .	...	7.70	...	2	...	(single lines)	1
Totaux . . .			14	5	7	6	14

E.		*Light rails.*	*Medium rails.*
a) New clean fractures	with internal transverse fissure	...	...
	without internal transverse fissure	12	2
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	9	...
	in the head	2	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	1	...
d) Number of pieces rails are broken into		Generally 2.	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Engl. tons.
MALAYA.																			
Federated Malay States Railways.																			
A. Rails outside tunnels *Light.*	...	172	..	...	103	...	...	121	...	1	145	4.3	...	606	...	1	1 147	0.54	16 but 12 in general use.
Total	...	172	...	...	103	...	...	121	...	1	145	4 3	...	606	...	1	1 147	0.54	

Number of train-miles: 5 091 707.

Number of fractures { total: 1.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 1.22.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D *Light rails*	100 %	...	1	...	...	...	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.												Miles.			Miles.		English tons.
GREECE.																			
State Railways.																			
1st Division.																			
Rails outside tunnels *Light.*	...	..	...	...	.	...	...	...	...	...	...	...	7	136.01	25	25	328.1	...	14.8
Rails outside tunnels *Medium.*	18	192.0	...	...	...	...	...	..	...	...	...	...	...	...	...				
2nd Division.																			
Rails outside tunnels *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	27	274.2	61.17	27	274.2	61.17	

Number of train-miles: 761 190.

Number of English ton-miles: 157 846 111.

Number of fractures { per 10 000 000 tr.-km. or 6 250 000 train-miles: 220.20.
per 1 billion tkm. or 612 000 000 ton-miles: 104.11.

	Percentage of fractures in the part covered by the fishplates	Percentage of fractures in the part clear of the fishplates	PERCENTAGE OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
			First Division.				
D. *Light rails* / *Medium rails*	...	100 %	68 %	8 %	24 %	72 %	28 %
			Second Division.				
Light rails	...	100 %	81.48 %	...	18.52 %	25.92 %	...

	First Division. *Light rails.*	First Division. *Medium rails.*
E. *a*) New clean fractures { with internal transverse fissure	...	18
without internal transverse fissure	7	...
d) Number of pieces rails are broken into	2	2 pieces: 17 6 pieces: 1

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Thessaly Railways.														Miles.			Miles.		English tons.
Rails outside tunnels Light.	...	...	...	...	...	...	...	...	...	...	...	...	1	125.5	4.95	1	125.5	4.95	9.2

Number of train-miles: 1 368 640.

Number of English ton-miles: 170 055 300.

Number of fractures { total: 1. per 10 000 000 tr.-km. or 6 250 000 train-miles: 18.42. per 1 billion tkm. or 612 000 000 English ton-miles: 64.25.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Piræus-Athens-Peloponnesus Railway.														Miles.			Miles.		
Rails out side tunnels Light.	...	...	...	...	...	...	...	...	...	...	...	...	40	506.4	49	40	506.4	49	...

Number of train-miles: 1 368 640.

Number of English ton-miles: 170 055 300.

Number of fractures { total: 40. per 10 000 000 tr.-km. or 6 250 000 train-miles: 181. per 1 billion tkm. or 612 000 000 English ton-miles: 144.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	16 %	84 %	5	...	...	20	15

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Rails in use for					TOTAL.	Approximate length of the lines considered as single lines.	Number of fractures per 1 000 km. or 625 miles	*Maximum axle load in service.*
	Less than 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	More than 30 years.				
	Number of fractures.	Number of fractures.	Number of fractures.	Number of fractures.	Number of fractures.				
1	2	3	4	5	6	7	8	9	10
ITALY. State Railways. (*)							Miles.		
Light rails	2	13	48	104	764 (**)	931	7 972	72.5	16.2
Medium rails :									
In tunnels	1	43	177	8	...	229	217	654.2 } 38.5	19.7
In the open	3	12	33	5	...	53	4 326	7.6 }	
Total. . .	4	55	210	13	...	282	6 543	38.5	...
Total general. . .	6	68	258	117	764	1 213	19 515	60.2	...

Number of train-miles : 89 734 348.
Total number of fractures : 1 213.

Number of fractures per 10 000 000 tr.-km. or 6 250 000 train-miles : 83.9.

* Standard gauge. — ** Most of these rails were put into service more than forty years ago

Characteristics of fractures of medium rails.

Fractures in the part of the rail :
— Covered by the fishplates : 224 = 79.4 %.
— Clear of the fishplates : 58 = 20.6 %.

— New and clean breaks through the whole of the rail section : 71 = 25.1 %.
— Fractures with old part : 211 = 74.8 %.

Rails broken into 2 pieces : 262 = 92.9 %.
Rails broken into 3 pieces : 17 = 6.0 %.

Rails broken into 4 pieces : 2 = 0.7 %.
Rails broken into 5 pieces : 1 = 0.3 %.

New and clean breaks through the whole of the rail section		Fractures with old part extending to the outer surface of the foot or the head of the rails :		Fractures with much rusted portions not extending to the outer face of the foot or head of the rail.
with oval mark.	without oval mark.	of the foot.	of the head.	
33 = 11.7 %	38 = 13.4 %	7 = 2.4 %	31 = 10.9 %	173 = 61.3 %

Nota. — As regards medium rails, most of the fractures occurred in tunnels (229 on 217 miles of track), whereas in the open, only 53 breaks on 4 326 miles of track

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	10
Mediterranean Railways. (Ferrovia Centrale Umbria.)											Miles.						Miles.		English tons.
Rails outside tunnels { *Light.*	...	...	...	...	...	...	...	...	...	2	70.2	17.7	...	...	...	2	70.2	17.7	14.3

Number of train-miles: 310 836.
No fractures on the Calabro-Lucane line.

Number of fractures { total: 2. per 10 000 000 tr.-km. or 6 250 000 train-miles: 39.80.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Società Nazionale di Ferrovie e Tranvie.														Miles.			Miles.		English tons.
A. Rails outside tunnels. { *Light.*	...	...	...	...	...	...	...	...	...	...	..	...	5	8	...	5	8	...	9.8
B. Rails in tunnels { *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	1	47.8	...	1	47.8	...	14.7
	...	...	...	...	...	...	...	...	...	...	...	...	6	55.8	...	6	55.8	...	

Number of train-miles: 210 586.

Number of English ton-miles: 34 934 845.

Total number of fractures: 6.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates	clear of the fishplates	on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails* . . .	...	...	...	4	2	...	6

E.	*Light rails*
a) New clean fractures without internal transverse fissure	5
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the head	...
{ in the foot	1
d) Number of pieces rails are broken into	2

Gestione Governativa delle Ferrovie Salentine. | No fractures in 1930.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LUXEMBURG. Prince-Henri Mining and Railway Company		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Rails in and outside tunnels { Light . .	...	2.21	...	...	10.9	...	1	18.9	32.8	...	21.1	...	6	12.3	302.8	7	85.3	51.0	15.7
{ Medium .	...	3.54	...	...	4.4	...	...	10.8	...	...	2.4	...	...	...	...	...	53.0	...	...
Totaux .	...	5.75	...	...	15.3	...	1	29.7	20.9	...	23.5	...	6	12.3	302.8	7	138.3	31.4	...

Number of train-miles: 914 725.

Number of fractures { total: 7. per 10 000 000 tr.-km, or 6 250 000 train-miles: 47.8.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. { Light rails . . .	...	7	...	...	...	...	...
{ Medium rails . .	...	...	...	...	...	...	...

	Light rails	Medium rails	Heavy rails
E. — a) New clean fractures { with internal transverse fissure . . . . / without internal transverse fissure	5	...	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head . . . . { in the foot . . . . / in the head . . .	2	...	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . . . . . { in the web	...	...	...
d) Number of pieces rails are broken into	2 pieces : 6 4 pieces : 1	...	...

Names of Administrations and description of rails.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.									Maximum axle load
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NORWAY. State Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels — Light	...	...	...	4	...	...	32	...	...	12	...	...	14	...	...	62	2 100.3	18.3	
A. Rails outside tunnels — Medium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18.6	...	
Total	...	...	...	4	...	...	32	...	...	12	...	...	14	...	...	62	2 118.9	...	
B. Rails in tunnels — Light	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	2	55.9	22	17.7
B. Rails in tunnels — Medium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.2	...	
Total	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	2	62.1	...	
C. The whole of A and B — Light	...	...	...	4	...	...	32	...	...	13	...	...	15	...	...	64	...	18.4	
C. The whole of A and B — Medium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24.8	...	
Total	...	...	...	4	...	...	32	...	...	13	...	...	15	...	...	64	2 181.0	18.2	

Number of train-miles: 9 321 000.

Number of English ton-miles: 2 262 850 000.

Number of fractures: total: 64. per 10 000 000 tr.-km. or 6 250 000 train-miles: 42.5. per 1 billion tkm. or 612 000 000 English ton-miles: 17.3.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates	clear of the fishplates	on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. Light rails	20 %	80 %	48	9	7	23	20
D. Medium rails	...	...	...	...	...	...	...
Total			48	9	7	23	20
Miles of single track of each class			1 497.5	683.5		963	640

	Light rails.	Medium rails.	Heavy rails
E. a) New clean fractures — with internal transverse fissure	...	...	...
E. a) New clean fractures — without internal transverse fissure	14	...	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head — in the foot	35	...	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head — in the head	5	...	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head — in the web	10	...	...
d) Number of pieces rails are broken into	4 pieces: 1. 3 pieces: 3. 2 pieces: 60	...	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	• *Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HOLLAND. Netherlands Railways.		Miles.			Miles.			Miles.			Miles			Miles.			Miles.		Engl. tons.
A. Rails outside tunnels. *Light.*	...	239 2	...	13	354.2	23	7	126.8	35	35	690.9	31	148	932.1	99	203	2343.2	54	15.7
Medium.	1	210.0	3	8	286.5	17	10	128.0	50	...	222.5	...	4	42.9	58	23	889.9	16	19.7
Total . . .	1	449.2	1	21	540.7	20	17	254.8	41	35	913.4	24	152	975 0	97	226	3233.1	43	

Number of train-miles: 33 865 320.
Number of English ton-miles: 12 231 360 000.

Number of fractures { total: 226.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 41.
per 1 billion tkm. or 612 000 000 English ton-miles: 11.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* .	56	44	173	16	14	203	...
Medium rails .	82	18	21	...	2	23	...
		Total . . .	194	16	16	226	...
		Miles of single track of each class . .	3066.6	166.5		3233.1	...

		RAILS: *Light rails*	*Medium rails*	*Heavy rails*
E. — a) New clean fractures	with internal transverse fissure	...	...	...
	without internal transverse fissure	78	4	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	94	10	...
	in the head	31	9	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	...	...
d) Number of pieces rails are broken into	2 pieces	158	18	...
	3 pieces	40	4	...
	4 pieces	5	1	...

COLONIES.	
State Railways in the Dutch Indies.	Our records do not enable us to draw up our statistics in the new form

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Dutch Indies Railway Company.											Miles.			Miles.			Miles.		English tons.
A. Light rails outside tunnels: 51.8 lb.-D/M.	...	...	...	...	...	...	...	...	...	1	27.3	23	...	...	...	1	27.3	23	12.2
51.8 lb.-G/S.	...	...	...	...	...	...	...	...	...	...	...	...	1	105	6	1	105.0	6	
67.5 lb.	...	...	...	...	...	...	...	...	...	...	...	...	1	126.8	5	1	126.8	5	13.8
Total.	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	3	259.1	...	

Number of train-miles : 3 023 395.

Number of English ton-miles : 322 220 625.

Number of fractures { total : 3.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 6.
per 1 billion tkm. or 612 000 000 English ton-miles : 6.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. Light rails . . .	33 %	67 %	...	1	2	...	...
Total . . .			...	1	2	...	...
Miles of single track of each class . .			259.1	...		...	...

		Light rails.
E. a) New clean fractures	with internal transverse fissure	...
	without internal transverse fissure	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	2
	in the head	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	1
d) Number of pieces rails are broken into		2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.					
POLAND. State Railways.																			
Light rails.	23	703.4	20.1	117	866.8	83.8	89	674.2	82	225	2 547.7	55.1	1654	8 099.0	126.9	...	...	...	...
Medium rails	65	1 076.2	37.5	...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...
Total . . .	88	1 784.6	30.8	117	866.8	83.8	89	674.2	82	226	2 547.7	55.1	1656	8 099.0	126.9	...	...	...	

Number of train-miles : 73 320 000.
Total number of fractures : 2 108.

Number of fractures per 10 000 000 tr.-km. or 6 250 000 train-miles : 178.

Note. — The above table is still drawn up in the old form. The number of tunnels on the Polish Railways in insignificant, and their influence on rail breakages has not been noticeable up to now.

PARTICULARS OF THE FRACTURES :

A. — Percentage of breakages in the respective portions of the rails { Covered by fishplates . . . . 58 %; Clear of fishplates . . . . 42 %

B. — *a)* Fresh and clean fractures through the whole of the rail section : 48 %. No silvery oval marks have been reported.

b) Fractures, part of which is old and much rusted, extending to the outer surface of the foot or head of the rail { 1. Rusted part in the foot . . 17 %; 2. Rusted part in the head . . 12 %

c) Fractures with much rusted portions *not* extending to the outer surface of the foot or head of the rail : 23 %.

d) The number of pieces into which the rails were broken : Generally 2.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PORTUGAL. Portuguese Railway Company.		Miles			Miles			Miles						Miles			Miles		
A. Rails outside tunnels { *Light.*	...	143.1	...	...	139.8	...	...	84.6	...	...	...	...	380	1 058.6	223	380	1 426.1	165.5	...
Medium	...	139.6	...	...	26.3	...	...	18.6	...	...	...	...	3	114.3	160	3	298.8	6.2	...
Total . . .	...	282.7	...	...	166.1	...	...	103.2	...	...	...	...	383	1 172.9	203	383	1 724.9	138.0	
B. Rails in tunnels { *Light.*	...	3.7	...	...	0.5	...	...	0.1	...	...	...	...	29	5.1	3 500	29	9.3	1 935	...
Medium.	...	2.1	...	...	...	...	...	1.0	...	...	...	...	...	...	...	...	3.1	...	...
Total . . .	...	5.8	...	...	0.5	...	...	1.1	...	...	...	...	29	5.1	3 500	29	12.4	1 453	
C. The whole of A and B { *Light.*	...	146.8	...	...	140.3	...	...	84.7	...	...	...	...	409	1 063.7	230	409	1 435.4	...	—
Medium.	...	141.7	...	...	26.3	...	...	19.6	...	...	...	...	3	114.3	160	3	301.9	6.2	...
Total . . .	...	288.5	...	...	166.6	...	...	104.3	...	...	...	...	412	1 178.0	210	412	1 737.3	147.3	

Number of train-miles: 7 879 635.
Number of English ton-miles: 1 593 351 300.

Number of fractures { total: 412.
per 10 000 000 tr.-km. or 6 250 000 train-miles: 324.9.
per 1 billion tkm. or 612 000 000 English ton-miles: 158.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m (1 in 100)	> 10 mm. per m. (1 in 100)
D. { *Light rails* . .	37	372	...	...	...	...	...
Medium rails .	...	3	...	...	...	...	...

E. *a*), *b*), *c*) and *d*). — No data.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
														Miles.			Miles.		English tons.
Portuguese Beira-Alta Railway.																			
Rails in and outside tunnels. } *Light.* .	...	...	...	...	...	...	...	...	...	...	...	...	12	156.7	47.6	12	156.7	47.6	13.8

Number of train-miles : 544 850.

Number of English ton-miles : 83 835 280.

Number of fractures { total : 12.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 136.8.
per 1 billion tkm. or 612 000 000 English ton-miles : 87.5.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . .	...	12	7	2	1	...	2
		Total . . .	7	2	1	...	2
	Miles of single track of each class . .		87.9	68.8		115.2	

E. *a*), *b*) and *c*). — No data.
d) Number of pieces rails are broken into : 2.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
RUMANIA. State Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels *Light* . .	17	755.8	14	14	380.1	22.9	34	282.5	74.9	63	1 292.4	30.3	1066	4 175.7	158.6	1194	6 836.5	108	17.7
Medium .	5	107.8	28.8	...	12.4	...	...	17.3	...	1	29 8	20.9	...	49.3	...	6	216.6	17.2	19.7
Total	22	863.6	15.8	14	392.5	22.2	34	299.8	70.5	64	1 322.2	30.1	1066	4 225.0	157.1	1200	7 103.1	105	

Number of train-miles : 32 827 335.

Number of English ton-miles : 2 623 708 700.

Number of fractures { total : 1 200.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 227.14.
per 1 billion tkm. or 612 000 000 English ton-miles : 279.7.

	Percentage of fractures in the part: covered by the fishplates	Percentage of fractures in the part: clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m (1 in 100)	on a rising or falling gradient. > 10 mm. per m (1 in 100)
D. *Light rails* .	18.85 %	81.15 %	650	421	123	1 010	184
Medium rails .	16.66 %	83.34 %	2	3	1	2	4
		Total . . .	652	424	124	1 012	188

E. *a*), *b*) and *c*). — No records.

	Light rails.	*Medium rails.*
d) Number of pieces rails are broken into	2 pieces : 1 123	6
	3 pieces : 67	...
	4 pieces : 2	...
	6 pieces : 1	...
	8 pieces : 1	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SWEDEN. State Railways.																	Miles.		English tons.
Rails in and outside tunnels. *Light.*	12	...	...	18	...	...	12	...	...	23	...	...	88	...	...	153	3 917	24	17.2
Medium.	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34	476	44	17.2
Total . .	46	...	...	18	...	...	12	...	...	23	...	...	88	...	...	187	4 393	26	

Number of train-miles : 20 639 850.
Number of English ton-miles : 1 793 326 300.

Number of fractures { total : 187. per 10 000 000 tr.-km. or 6 250 000 train-miles : 56.30. per 1 billion tkm. or 612 000 000 English ton-miles : 63.77.

	Light rails	*Medium rails*
E. *b*) Fractures with much rusted old part, extending to the outer surface of the foot	37	4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Trafikförvaltningen Göteborg-Dalarne-Gäfle.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Rails outside tunnels. *Light.*	1	118.1	5.3	1	85.7	7.3	...	57.1	...	...	51.0	...	7	138.0	33	9	449.9	12.4	15.7
Medium.	...	49.7	...	...	99.4	...	4	82.6	30	...	65.2	...	...	...	...	4	296.9	3.4	17.7
Total . . .	1	167.8	3.7	1	185.1	3.4	4	139.7	17.8	...	116.2	...	7	135.0	33	13	746.8	10.8	

Number of train-miles : 3 417 700.
Number of English ton-miles : 310 310 000.

Number of fractures { total : 13. per 10 000 000 tr.-km. or 6 250 000 train-miles : 23.6. per 1 billion tkm. or 612 000 000 English ton-miles : 25.6.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D *Light rails* . .	33 %	67 %	4	4	1	4	5
Medium rails. .	50 %	50 %	1	2	1	4	...
		Total . . .	5	6	2	8	5
	Miles of single track of each class . . .		575.4	171.4		662.3	84.5

	Light rails.	*Medium rails.*
E. *a*) New clean fractures { with internal transverse fissure	...	...
without internal transverse fissure	2	4
b) Fractures with much rusted old part, extending to the { in the foot	3	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Trafikaktiebolaget Grängesberg-Oxelösunds Järnväger.																			
Rails outside tunnels } *Light* .	...	...	...	...	...	...	1	4	156	...	5	...	3	199.8	9.3	4	208.8	11.9	17.7

Number of train-miles: 1 160 670.

Number of English ton-miles: 279 278 550.

Number of fractures { total: 4.
per 10 000 000 tr.-km. or 5 250 000 train-miles: 21.4.
per 1 billion tkm. or 612 000 000 English ton-miles: 8.7.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails.* . .	50 %	50 %	1	1	2	...	...
		Total . . .	1	1	2	...	...
	Miles of single track of each class . .		169.0	39.8		107.9	21.2

	Light rails.
E. *a)* New clean fractures { with internal transverse fissure . . .	...
without internal transverse fissure . . .	3
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the head . . .	...
in the foot . . .	1
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head { in the web . . .	...
d) Number of pieces rails are broken into . . .	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Stockholm-Västeras-Bergslagen. Railway.											Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	4	271.5	9.1	4	271.5	9.1	7.8
Medium.	...	...	...	...	...	...	...	...	...	...	26.7	...	...	...	...	...	26.7	...	...
Total	...	...	...	...	...	...	...	...	...	...	26.7	...	4	271.5	9.1	4	298.2	8.3	

Number of train-miles : 1 353 730.

Number of English ton-miles : 49 969 550.

Number of fractures { total : 4.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 18.3.
per 1 billion tkm. or 612 000 000 English ton-miles : 48.9.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES : on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails.*	...	100 %	3	1	...	3	1
Medium rails	...	...	...	...	...	...	...

		Light rails.	Medium rails.
E. b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	2	...
	in the head	1	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	1	...

Västergotland-Göteborg Railway. — No rail breakages in 1930.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS : Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.												Miles.		
SWITZERLAND.																			
Federal Railways.																			
(Running track).																			
A. Rails outside tunnels. *Light*	...	78.3	...	...	83.9	...	2	...	...	2	...	...	70	...	...	74	...	...	
Medium	9	933.9	5.9	6	402.7	9.3	8	...	...	19	...	...	58	...	...	100	...	...	
Total	9	1 012.2	5.4	6	486.6	7.7	10	...	...	21	...	...	128	...	...	174	2 282.3	47.4	
B. Rails in tunnels *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium	1	77.1	8.1	3	69.0	27	12	...	...	24	...	...	...	...	...	40	...	.	
Total	1	77.1	8.1	3	69.0	27	12	...	...	24	...	...	...	...	...	40	136.7	178.6	
C The whole of A and B. *Light*	...	78.3	...	...	83.9	...	2	...	...	2	...	...	70	...	...	74	579.1	79.4	
Medium	10	1 011.0	6	9	471.7	11.9	20	...	...	43	...	...	58	...	...	140	1 842.4	47.2	
Total	10	1 089.3	5.6	9	555.6	10	22	...	...	45	...	...	128	...	...	214	2 421.5	54.9	

Number of train-miles : 24 883 400.

Number of English ton-miles : 1 263 500 000

Number of fractures { total : 214. per 10 000 000 tr.-km. or 6 250 000 train-miles : 53.4. per 1 billion tkm. or 612 000 000 English ton-miles : 103.6.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	26.7 %	8 %	45	17	12	56	18
Medium rails	42.0 %	23.3 %	85	36	19	86	54
		Total	130	53	31	142	72

		Light rails.	*Medium rails.*
E. *a)* New clean fractured	with internal transverse fissure	1	...
	without internal transverse fissure	12	14
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	21	44
	in the head	6	11
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	28	51

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bernese Alps Railways. (Berne-Lœtschberg-Simplon. — Berne-Neuchâtel.)		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		
A. Rails outside tunnels { *Light*	...	4.6	...	...	1.6	...	...	...	...	...	15.2	...	...	42.4	...	...	63.8	...	
A. Rails outside tunnels { *Medium*	...	3.8	...	...	...	...	...	...	...	...	9.6	...	...	...	...	...	13.4	...	
Total	...	8.4	...	...	1.6	...	...	...	...	...	24.8	...	...	42.4	...	...	77.2	...	
B. Rails in tunnels { *Light*	...	...	...	...	...	...	1	0.5	1 228	6	28.3	135	...	...	...	7	28.8	150	
B. Rails in tunnels { *Medium*	...	...	...	1	1.5	413	...	3.3	...	...	...	...	...	...	...	1	4.8	130	
Total	...	...	...	1	1.5	413	1	3.8	164	6	28.3	135	...	...	...	8	33.6	148	
C. The whole of A and B { *Light*	...	4.6	...	...	1.6	...	1	0.5	1 228	6	43.5	85	...	42.4	...	7	92.6	47	
C. The whole of A and B { *Medium*	...	3.8	...	1	1.5	413	...	3.3	...	...	9.6	...	...	..	...	1	18.2	34	
Total	...	8.4	...	1	3.1	204	1	3.8	164	6	53.1	70	...	42.4	...	8	110.8	45	

Number of train-miles : 1 152 560.
Number of English ton-miles : 33 388 750.

Number of fractures { total : 8. per 10 000 000 tr.-km. or 6 250 000 train-miles : 43. per 1 billion tkm. or 612 000 000 English ton-miles : 14.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. 1 in 36	1 in 55	> 10 mm. per m. (1 in 100)
D. { *Light rails*	75 %	12 1/2 %	6	1	...	4	1	2
D. { *Medium rails*	12.5 %	...	1	...	...	...	...	1
		Total	7	1	...	5		3
	Miles of single track of each class		81.1	29.7		50.4		30.1

	Light rails.	*Medium rails.*
E. *d*) Number of pieces rails are broken into	2	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rhætic Railway.																			
A. Light rails outside tunnels. 1929	...	...	...	..	...	...	1	...	...	...	...	...	5	...	...	6	...	...	
1930	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	
B. Light rails in tunnels. 1929	...	...	...	...	...	...	1	...	...	2	...	...	1	...	...	4	...	...	
1930	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	
C. The whole of A and B 19.9	...	...	...	...	...	...	2	...	...	2	...	...	6	...	...	10	...	...	
1930	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	2	...	...	

Number of train-miles { 1929 : 1 135 990. 1930 : 1 075 720.

Number of English ton-miles { 1929 : 146 450 350. 1930 : 157 806 000

Number of fractures {
total : for 1929 : 10; for 1930 : 2.
per 10 000 000 tr.-km. or 6 250 000 train-miles { 1929 : 58. 1930 : 11.
per 1 billion tkm. or 612 000 000 English ton-miles { 1929 : 42. 1930 : 8.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates	clear of the fishplates	on straight lines or curves of > 800 m. (40 chains) radius	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient. ⩽ 10 mm. per m. (1 in 100)	on a rising or falling gradient. > 10 mm. per m. (1 in 100)
D. *Light rails* 1929	20 %.	80 %.	6	...	4	5	5
1930	...	100 %.	...	1	1	...	2

E.	*Light rails* (1930).
a) New clean fractures { with internal transverse fissure	...
without internal transverse fissure	1
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the foot	1
in the head	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head { in the web	...
d) Number of pieces rails are broken into	4

Yverdon-Ste Croix Railway. No rail breakages in 1930. — Total length of single track : 17.67 miles (light rails), of which 0.3 mile in tunnels. Number of train-miles : 52 690. Number of Engl. ton-miles : 2 731 685.

Lausanne-Ouchy Railway. No breakages in 1930.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CZECHOSLOVAKIA. State Railways.		Miles			Miles.			Miles.			Miles.			Miles.			Miles.		Engl. tons.
A. Rails outside tunnels — *Light.*	10	517.5	12.0	18	495.4	22.6	43	399.5	66.9	57	1 062.6	33.3	843	4 922.0	106.4	971	7 397.0	81.6	...
Medium.	3	654.9	2.8	8	516.4	9.6	17	356.4	47.7	33	490.1	41.8	86	581.1	92.0	147	2 598.9	37.1	...
Total . . .	13	1 172.4	6.9	26	1 011.8	16.0	60	755.9	60.0	90	1 552.7	36.0	929	5 503.1	104.9	1118	9 995.9	70.4	
B. Rails in tunnels — *Light.*	...	3.1	...	...	3.1	...	4	3.2	739.5	...	2.0	...	1	4.7	132.0	5	16.1	189.4	...
Medium.	...	6.4	...	...	1.5	...	...	0.3	...	..	0.8	...	...	2.8	...	...	11.8	...	...
Total . . .	...	9.5	...	...	4.6	...	4	3.5	673.9	...	2.8	...	1	7.5	82.8	5	27.9	110.0	
C. The whole of A and B — *Light.*	10	520.6	11.9	18	498.5	22.4	47	402.7	72.5	57	1 064.6	33.3	844	4 926.7	102.7	976	7 483.1	81.8	12.8-15.7
Medium.	3	661.3	2.8	8	517.9	9.6	17	356.7	47.6	33	490.9	41.8	86	583.9	91.5	147	2 610.7	36.9	16.8
Total . . .	13	1 181.9	6 8	26	1 016.4	15.9	64	759.4	63.7	90	1 555.5	36.0	930	5 510.6	104.9	1123	10 023.8	70.6	

Number of train-miles: 73 321 400.
Number of English ton-miles: 21 431 797 650.

Number of fractures. { total: 1 123. per 10 000 000 tr.-km. or 6 250 000 train-miles: 95.2. per 1 billion tkm. or 612 000 000 English ton-miles: 32.0.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails* . .	55.1	44.9	538	245	183	750	216
Medium rails .	54.1	45.9	142	10	5	154	3
		Total . . .	680	255	188	904	219
	Miles of single track of each class . .		6 940.2	4 083.6		7 892.6	2 131.2

		Light rails.	*Medium rails.*
E. *a)* New clean fractures	with internal transverse fissure . . .	191	26
	without internal transverse fissure . . .	238	28
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot . . .	188	41
	in the head . . .	157	54
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web . . .	178	22
d) Number of pieces rails are broken into . . .		Generally 2. — One 72-lb per yard rail was broken	

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS. Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TURKEY.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Engl. tons.
State Railways.																			
Rails outside tunnels. *Light*	...	456.7	...	1	104.4	5.95	...	62.1	...	...	61.5	...	6	603.4	...	7	1 288.1	3.8	16.7
Rails outside tunnels. *Medium*	...	...	...	...	...	...	...	14.3	...	...	...	...	...	...	...	...	14.3	...	16.7

	Percentage of fractures in the part: covered by the fishplates	Percentage of fractures in the part: clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	NUMBER OF FRACTURES: on curves of ≤ 800 m. (40 chains) radius. Lower rail.	NUMBER OF FRACTURES: on curves of ≤ 800 m. (40 chains) radius. Higher rail.	NUMBER OF FRACTURES: on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	NUMBER OF FRACTURES: on a rising or falling gradient. > 10 mm. per m (1 in 100)
D. *Light rails*	...	100	7	...	...	6	1
D. *Medium rails*	...	...	...	...	...	...	...

E.		*Light rails.*	*Medium rails.*
a) New clean fractures	with internal transverse fissure	3	...
	without internal transverse fissure	1	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	2	...
	in the head	...	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	1	...

Smyrna-Cassaba Railway and Extension.

No fractures in 1930.
Total length of single track: 436.2 miles (light rails), of which 4.1 miles in tunnels. Maximum axle load: 14.3 Engl. tons.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
JUGOSLAVIA. State Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		Engl. tons.
A. Rails outside tunnels *Light.*	31	335.6	57	34	488.4	43	19	258.5	46	53	375.3	88	903	2 537.1	221	1040	3 991.9	162	9.8-15.7
Medium.	2	293.9	4	1	1.2	500	7	4.4	1 000	43	174.6	153	98	170.3	358	151	641.4	146	14.8
Total . . .	33	629.5	33	35	489.6	44	26	262.9	62	96	549.9	109	1001	2 707.4	230	1191	4 639.3	160	

Number of train-miles: 22 801 535.

Number of English ton-miles: 1 798 218 180.

Number of fractures { total: 1 191. per 10 000 000 tr.-km. or 6 250 000 train-miles: 325. per 1 billion tkm. or 612 000 000 English ton-miles: 405.

	Percentage of fractures in the part: covered by the fishplates	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	Higher rail.	on a rising or falling gradient. ≤ 10 mm. per m. (1 in 100)	> 10 mm. per m. (1 in 100)
D. *Light rails*	32.9 %	67 1 %	760	190	90	940	100
Medium rails	66.2 %	33.8 %	56	51	44	102	49
		Total . . .	816	241	134	1 042	149
		Miles of single track of each class . .	3 711.6	927.7		4 175.1	464.2

		Light rails.	*Medium rails.*
E. a) New clean fractures	with internal transverse fissure	307	87
	without internal transverse fissure	390	36
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	179	5
	in the head	121	1
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	43	22
d) Number of pieces rails are broken into		2 pieces: 1 001 3 pieces: 23 4 pieces: 11 5 and over: 5	147 3 ... 1

MISCELLANEOUS INFORMATION.

[625 .174 (.43)]

1. — A high-powered rotary snow plough.

Figs. 1 and 2, p. 1078.

(*The Railway Engineer.*)

Many railways abroad are regularly confronted with difficulties in keeping traffic moving owing to heavy falls of snow, and although their use is fortunately not an annual necessity in this country, snow ploughs are of considerable interest to most railway engineers. The accompanying illustrations show the constructional features of a high-powered rotary snow plough built by the firm of Henschel & Sohn A. G., Kassel. This type of machine was used with complete success on the East Prussian lines of the German Railways during the exceptionally severe winter of 1928-1929, to clear drifts which in some places were over 16 feet in depth.

The plough is not self-propelling, but is pushed by one or several banking engines, as may be necessary. Fuel and water are carried in a separate tender. The rotary plough wheel itself is driven through bevel gearing by a two-cylinder engine, supplied with steam by an ordinary locomotive boiler.

The plough wheel works in a casing which, at the sides and bottom, is brought as near as possible to the structure gauge. This casing acts as a shovel, cutting into the snow, loosening it and guiding it to the rotating wheel. At the top, the casing tapers to form a funnel through which the snow is flung on a wide arc. When working in about 10 feet of snow, with the plough wheel running at 150 r. p. m., the range of projection is about 66 feet.

The plough wheel can be run in either direction, according to the direction in which snow is to be thrown, a reversible shutter closing that side of the top opening of the casing which is not in use. It is thus a simple matter to change the projection of the snow from one side of the track to the other as often as desired, to suit the lie of the country or any other consideration.

The machine is fitted with hand, steam or air brakes which can be used as desired and, for transport purposes, a buffer beam with buffers and coupling gear is fitted in front of the plough wheel.

The boiler, engine and cab are enclosed by one body, as shown, so that the operating crew is completely protected from the weather and can work in warmth and comfort. The driver's compartment is immediately behind the plough wheel, so that the driver can easily supervise the working of the machine. A speaking tube and bell line keep him in touch with the fireman, and a system of whistle signals is used to communicate with the driver of the banking engine.

Obviously, there must be a certain clearance between the plough-wheel casing and the surface of the rails. In order that snow and ice may be removed as completely as possible in one operation, giving a full clearance profile and rendering superfluous any secondary cleaning by hand or otherwise, it is recommended that the following accessories be used :

1. Side flaps on the plough-wheel casing, swung out by hand or by steam power, to widen the passage. During transport, these flaps must, of course, be kept inside the permissible loading gauge.

2. The ice-breaker in front of the first axle to clear space for the wheel rims.

3. Snowscraper behind the leading bogie to remove snow left by the main plough.

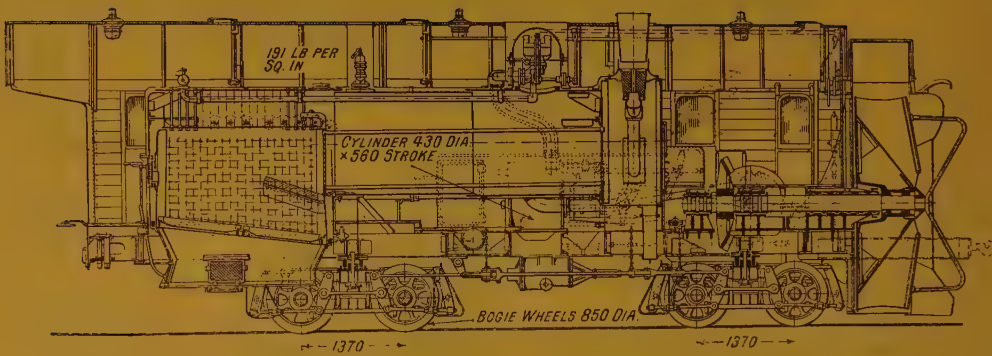

Fig. 1. — Sectional elevation.

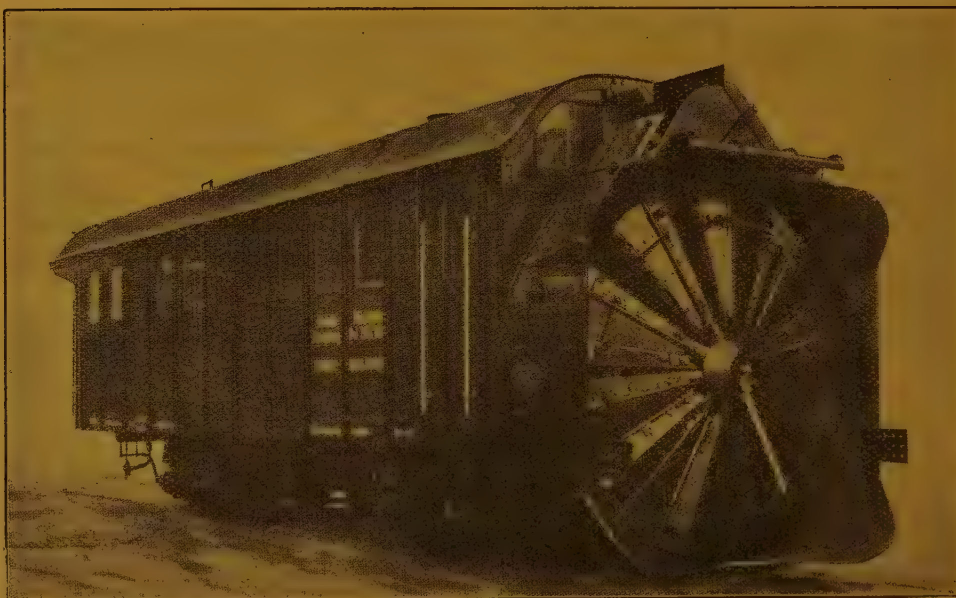

Fig. 2. — General view.

In freshly fallen snow, about 10 feet in depth, the rotary plough can be advanced at the rate of from 3 to 3 3/4 m. p. h. If the depth is greater the speed is naturally reduced, whereas it rises rapidly in lighter drifts. The gradient of the track is of minor importance in this connection, its equivalent tractive resistance being small compared with the resistance offered by the snow.

Rotary snow ploughs of the type described have been used with equal success on the Anatolian Railway, the Bern-Lötschberg-Simplon Railway, the Swiss Federal Railways (Gotthardbahn), and the Austrian Federal Rail-

ways. Recent deliveries of similar machines include an eight-wheeled plough (16.3 tons axle-load) for the Oriental Railways (Turkey); two ten-wheeled ploughs (13.6 tons axle-load) for the Jugoslaw State Railways; and one twelve-wheeled plough (12.0 tons axle-load) for the Austrian Federal Railways.

The principal dimensions are as follows :

Gauge.	1 435 mm. (4 ft. 8½ in.).
Cylinder, diameter .	430 mm. (16.93 in.).
Stroke	560 mm. (22.05 in.).
Gearing	725 : 1 285.
Boiler pressure . .	13 at. (191 lb. per sq. in.).
Heating surface (fire side)	122.3 m² (1 316 sq. ft.).
Grate area. . . .	2.6 m² (27.98 sq. ft.).
Wheel diameter . .	850 mm. (33.46 in.).
Wheelbase of bogie.	1 370 mm. (53.94 in.).
Total wheelbase . .	6 695 mm. (263.6 in.).
Weight, in running order	66 500 kgr. (65.45 tons).

[621. 138.2 (.44)]

2. — New locomotive coaling plant at Nevers, Paris-Lyons-Mediterrean Railway.

Figs. 1 to 3, pp. 1080 and 1081,

(*The Railway Gazette.*)

The locomotive coaling plant illustrated herewith is located at Nevers, on the Paris-Lyon-Mediterranean Railway. It is of high capacity and has a span of 92 feet. It comprises a loading bridge and stationary elevated bunker. The loading bridge embraces the coal depot and one siding for coal arrivals, whilst two further lines used for the delivery of coal run along one side and two engine coal tracks along the opposite side of the bridge track. Four elevated coaling bunkers with weighing appliances are situated between the two locomotive coaling tracks. They can discharge their contents through either side into the tenders waiting below.

The grab-slewing crane travelling on the loading bridge has a capacity of 3 tons and a radius of 41 feet. Its automatic grab holds 1.65 cubic yards and takes the coal from the wagons, either dumping it down in the coal depot or conveying it straight to the elevated bunker. These bunkers are not built in a continuous line, but are placed about 82 feet apart along the entire length of the depot; hence, several locomotives can take in their coal supplies simultaneously. The sub-division of the bunkers carries with it an important advantage, inasmuch as the loading bridge need not be moved about the coal depot, which latter is 427 feet long, to the same extent as would be the case if the bunkers were close together, for the reason that the crane operator, in charging a bunker, can take the coal from the coal depot or the wagon from positions which he may just be able to reach with the grab without moving the bridge itself. Moreover, by dividing the total bunker capacity into four, several grades of fuel can be kept in readiness for the engines coming along to coal. There is a slack pit extending for a distance of 98 feet beneath and between the coal sidings, and this is also accessible for the crane on the bridge, the consequence being that the automatic grab can be used to clear it.

The design of the bunkers is particularly interesting. Each elevated bunker holds 50 tons and bears on a system of weighing levers communicating the load to an automatic weighing machine on the crane. In order to weigh the contents of a bunker, the man at the operator's stand, by turning a crank handle, brings the weighing machine into its working position, after which the various movements involved in the weighing process take place automatically. The adjusting and sliding weights move of their own accord until the scale is in equilibrium. When this condition has been established a signal indicates the fact to the operator. In the meantime, the ticket-printing device has

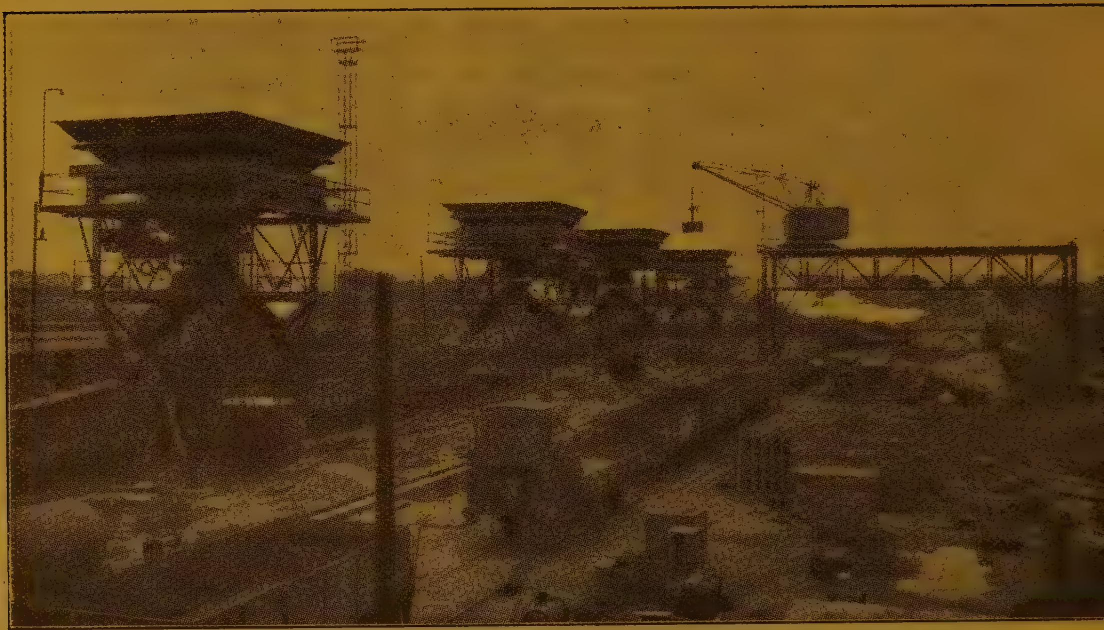

Fig. 1. — High-capacity plant manufactured by the Demag A. G., of Duisburg.

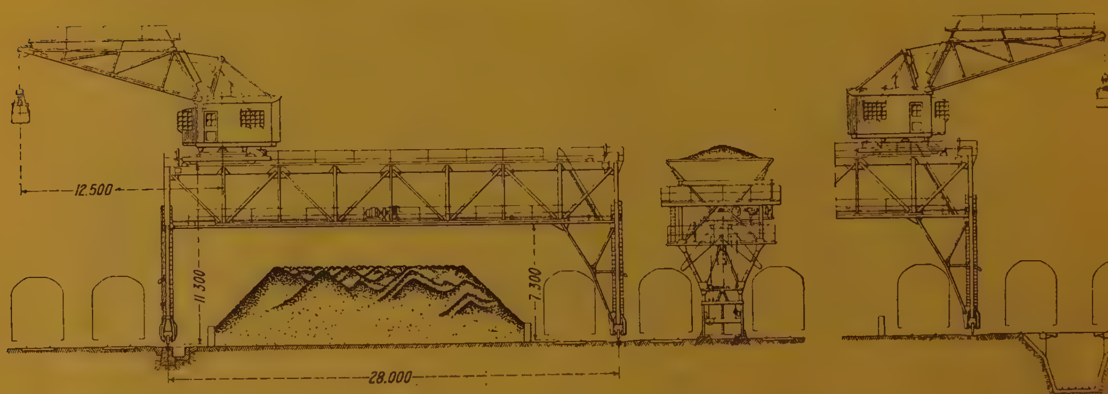

Fig. 2. — Sketch showing radius of operation. Dimensions in metres.

also been set accordingly by automatic action, and the operator has only to insert a blank ticket to ascertain the weight of the machine. After recording the weight on the ticket, the crank should be reversed to return the automatic weighing machine to its initial position. Coal can now be discharged from the bunker into the tender by operating

Fig. 3. — Near view of crane and elevated coal bunker.

one of the electric bunker-discharge gates with the aid of buttons. This completed, the bunker contents are re-weighed in the same way as before, the result being again recorded on the ticket. The difference found by substraction is the weight of coal given out, and in order to facilitate checking and control, an automatic numbering machine numbers each ticket consecutively after every second weighing. This ensures that the weight tickets issued to the engine-drivers all bear continuous numbers.

The coal issuing from the bunker reaches the tender through chutes, an adjustable flap at the top directing the coal to the right or left-hand side, as required. The bunker discharge, as well as the weighing machines, can be controlled from the operator's stand, so that one operator suffices to manage the whole process of coaling. In order to prevent mistakes and errors of weighing due to inattention or carelessness, the plant is equipped with automatic locking devices, one of which prevents the weighing of coal with

the bunker discharge open, while the other makes it impossible to open the bunker discharge during the weighing process.

The bunker plant is designed throughout to warrant absolute reliability, no matter what the circumstances may be. Ladders and galleries render all parts easily accessible for inspection. Even should the supply of electric power break down, this cannot create any disturbance, since the chain drive provided for use in emergency can be employed to operate the bunker discharge from the operator's stand. Arrangements are made for warming the walls of the bunker during winter in order that the coal should be prevented from freezing. The hot waste gases of the furnace pass along to the double walls of the bunker, where they gradually rise to the top, ribs being provided to ensure that the bunker gets warm evenly all along its circumference.

This plant was built and supplied by the Demag A. G., of Duisburg.

NEW BOOKS AND PUBLICATIONS.

[385 .09 (.493]

LAMALLE (U.), Civil Mining Engineer, Director, Working Department, Belgian National Railway Company, Professor of railway studies at the University of Louvain. — **The part played by Belgium in the development of the railway**. — A study published in the March-April 1931 number of the Bulletin of the « Société belge des Ingénieurs et des Industriels » (*Belgian Engineering and Industrial Society*), 92 pages, numerous illustrations, maps and diagrams. — Brussels, Editional Office of the Bulletin of this Society, 3, rue Ravenstein. (Price : 7.50 Belgian francs.)

During 1930 the people of Belgium celebrated in various ways the centenary of her independance. The « Société Belge des Ingénieurs et Industriels » had the happy inspiration of asking several eminent and well-qualified persons to write the history of the development of the chief industries of the country during this century. Among these the railway takes a place of primary importance and it was fitting that it should have special mention in these laudatory lists. The task fell to Mr. Lamalle. In his position as Director of the Working Department of the Belgian Railways, he naturally analysed the economic role of the railways. The economic circumstances which led to their establishment in Belgium had in fact a very close relationship with the political events of a hundred years ago. But if the railway era began soon after independence was achieved, it is necessary to go back further in order to trace the beginnings of steam traction over permanent ways, and further back still in order to arrive at the period of the inventions and labours which led up to it.

The author in a preamble gives a brief history of the permanent way and of the locomotive from their origin up to 1930. He shows how the permanent way came forth from the mines to establish itself on the ground level in the form of two lines of raised rails. He recalls the efforts of the men who invented the steam locomotive in England among whom the great figure of George Stephenson is preeminent.

Belgian activity in the matter of public railways began in the discussion of the proposals put forward to maintain the prosperity of the port of Antwerp. The project of a railway won the day over that of a water-way and soon was amplified into a railway system of some importance. The first section was inaugurated on the 5 May 1835. These events are recalled in several very interesting pages in which the ideas, the events, the dates and the illustrations recall to life an epoch that played a decisive part in the future history of the country.

Afterwards there follows a report of the development of the railway system, the period of the construction of the lines by the State, and then that of private concessions, and finally the policy of repurchase which led to almost complete unification.

The author reviews in succession the evolution of the rolling stock both traction and coaching stock, and that of the permanent way, showing the principal stages of change, noting the more interesting improvements and giving credit to those to whom they were due. The nature and increase in the traffic, the working methods, the ever-increasing facilities offered to the public, the evolution of the rates and the working results are analysed in such a way that the reader is

easily able to appreciate the extent of the path covered and the greatness of the services rendered.

The author has not limited his report to Belgium alone. The foreign countries, both metropolitan and colonial, both in Europe and in other parts of the world, in which Belgians have created railways are very numerous. In particular, their own colony, the Belgian Congo, has been the field of action of a whole group of pioneers who have endowed it with many railway lines. The results of this activity outside its own boundaries is worthy of the country which was the first to set up a public railway on the Continent.

E. M.

[656 257 (.73) & 656. 258 (.73)]

AMERICAN RAILWAY ASSOCIATION, SIGNAL SECTION. — **American Railway Signaling Principles and Practices. Chapter XVI : Interlocking** — New York, N.Y., Signal Section, A. R. A , 30, Vesey Street. 1 pamphlet (6 × 9 inches) of 66 + 18 pages, with 43 figures. (Price, including postage : 25 cts. for members and railroad employees — 35 cts. for non-members and non railroad employees. — Binder to accomodate 13 chapters, $ 1.00 including postage)

Chapter XVI of this valuable collection of short notes on signalling practice already mentioned in the Bulletin (1), forms with chapters XVII, XVIII and XIX a complete study of locking frames.

The last two describe the locking frames and the point locks in electro-pneumatic and all-electric equipment.

Chapter XVI deals more particularly with the question of the « interlocking » of the frames and logically begins by describing purely mechanical installations.

The first locking frame described is a modified Saxby and Farmer (improved S & F machine) which outwardly does not differ from the Saxby with interlocking gear and locking pieces, but in which this interlocking gear and locking pieces have been replaced by vertical bars and slides as on a Stevens table. The bars are controlled by the latches of the levers thereby giving, as with the Saxby table with interlocking gear, latch handle locking. The stops on these bars are either rivetted when interlocking is wanted, or pinned for conditional locking when a third lever occupies a given position.

Two other tables are described : a Saxby and Farmer (English) machine in which the locking is carried in front and half way up the frame ; the other (a style « A » machine) on which the locking is arranged vertically at the foot of the table. These appear suitable for less important boxes.

Two types of locking frames are used in America in cases where power is available : one both for electro-pneumatic and for all-electric ; and the other for all-electric alone.

Both have mechanical interlocking arranged vertically on one and horizontally on the other, working on the same general principle as those mentioned above but having parts of smaller dimensions.

In America interlocking frames known as electro-mechanical machines are also used ; these are a combination of the mechanically operated frame and an interlocking table similar to that of the electrical interlocking frame. Photographic

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(1) See *Bulletin of the Railway Congress*, No. 3, March 1931, p. 278.

views are given here and the description is given in Chapter XVII.

For most of these fittings the book gives a plan of the layout of the lines and of the signalling with a table of the interlocking and a diagram of the interlocking details. These documents are very useful as primers.

E. M.

[621. 335 (.02)]

Elektrische Vollbahnlokomotiven. (**Electric main line locomotives.**) — Issued by the A. E. G., in collaboration with the late Dr. Ing. GRÜNHOLZ. 1 vol., Din. A 4, of 360 pages with 477 illustrations and 13 tables. Berlin; Norden G. m. b. H., printers and publishers.

This work deals chiefly with electric main line locomotives for single-phase alternating current, but direct current locomotives are also described although not quite so thoroughly. The illustrations are mainly those of A. E. G. designs, but designs of other manufacturers are also included and critically surveyed.

Part 1 discusses both A. C. and D. C. electric locomotives and compares their output characteristics with those of steam locomotives.

Part 2 deals with the mechanical portion and more particularly the running mechanism comprising the driving and carrying axles. A short section deals with the guidance of the locomotive on the straight and in curves.

The drive is dealt with most comprehensively. After a brief explanation of the requirements, the various types of drives such as separate axle drive by axle motor, gearless drive by parallel crank gear, separate axle drive by geared motor and group drive of coupled axles by means of geared motors are described. There is also a chapter dealing with the principles of the parallel crank drive and the oscillation which is associated with this type of drive. The geared type of drive which is today almost universal, is also discussed.

The construction of the locomotive frame is clearly shown by means of a large number of excellent illustrations. Following on is a description of the constructional methods and the system of gauging used in the manufacture of the frame and driving gear details to ensure the necessary exactitude.

The 3rd and most complete part deals with the electrical side. A. C. and D. C. locomotives are dealt with separately as the most important details for each type differ very considerably.

As regards the high-tension alternating current locomotive field, the current collecting gear and main control gear for which latter oil switches have hitherto almost exclusively been used, together with their contact apparatus, switches and contact breaking gear are described.

In regard to transformers, the most important theoretical considerations are discussed and the various types presented according to their arrangement of iron cores, winding and method of insulation. The excellent illustrations of transformers and their main component parts enable a very clear picture to be formed of these details.

The electrical theory of motors is treated in a comprehensive and thorough manner. The peculiarities of D. C. series connected motors and their suitability for railway traction purposes are shewn, and their construction, and field and armature winding, described. The difficulties experienced in operation with A. C. current due to the pulsating field are enumerated with a description of how by correct dimensioning of details these are overcome. Resistance and regenerative braking control are described. The construction and details of A. C. motors are shewn by numerous and va-

luable illustrations which also give sectional views of many of the most modern railway traction motors.

A chapter is devoted to and thoroughly deals with the control of motors. The various methods for the step by step regulation of the motor voltage are given and the controllers, contactors, etc. used for this purpose, are fully described.

Finally follows a description of the various auxiliaries used for air compression, heating, air cleansing, etc.

The D. C. locomotive is described on exactly similar lines.

In conclusion tables are given with very complete particulars of 13 A. C. and D. C. locomotives together with clear general arrangement drawings.

This work presents an excellent view over the whole field of electric main line traction. It will be welcomed by all those who wish to obtain information in this very comprehensive branch of engineering. The book is especially valuable because it not only deals with all salient features, but also carefully discusses and describes auxiliaries about which very little has hitherto been published or about which one must seek tediously information from many sources. The expert with full knowledge of the subject will also be pleased to be able to make use of this work as it puts at his service all the information he requires and in a clear manner.

ERRATUM.

BULLETIN, *August 1930 number, p. 1834, first column, 5th § (Summary of Proceedings, Madrid Session, 1930, Question II):*

Instead of : « ... Mr. MÜLLER (*Deutsche Reichsbahn Gesellschaft*) stated that the Reichsbahn had been in touch with the Sperry Co. and that experiments had been made in Germany with the Sperry detector. These had not been... ».

Read : « ... Mr. MÜLLER (*Deutsche Reichsbahn Gesellschaft*) stated that the Reichsbahn had been in touch with the Sperry Co. and that experiments had been made *in America,* with the Sperry detector, *on German track material lent by the Reichsbahn.* These had not been... ».

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General secretary of the Permanent Commission of the International Railway Congress Association.

(JULY 1931)

[016 .385. (02]

I. — BOOKS.

In French.

1931 — 72. (02
ARNAUD (E.).
Cours d'architecture et de constructions civiles.
Paris (6e), Ch. Béranger, 15, rue des Saints-Pères. Deux volumes, ensemble plus de 1 200 pages, 236 planches, 1 atlas et figures. (Prix : 2 volumes et atlas, 460 francs.)

1931 — 385 .57
BAUMGARTEN (F.).
Les examens d'aptitude professionnelle.
Paris (6e), Dunod, 92, rue Bonaparte. Un volume (16 × 25), 656 pages. (Prix : 171 francs.)

1931 — 656 .2
BRUN (R.).
Précis de transports commerciaux. Tome II, Transports par chemins de fer.
Paris (6e), Dunod, 92, rue Bonaparte. Un volume (13 × 21), 353 pages. (Prix : 32 francs.)

1931 — 693. (02
CABIAC.
Manuel de maçonnerie.
Paris (6e), Baillière et Fils, rue Hautefeuille, 19. Un volume (11 × 16), 268 pages, 221 figures. (Prix : 19 francs.)

1931 — 691
CHAMPLY (R.).
Béton armé, enduits et agglomérés.
Paris (6e), Pierre Roger, 54, rue Jacob. Un volume in-8°, 226 pages, 137 gravures. (Prix : 15 francs.)

1931 — 694
CHAMPLY (R.).
Nouvelle encyclopédie pratique du bâtiment et de l'habitation. Quatrième volume : Charpentes en bois, échaufaudages.
Paris (6e), Desforges, Girardot & Cie, 27 et 29, quai des Grands-Augustins. Un volume (in-16), 144 pages, 245 figures. (Prix : 9 francs.)

1931 — 656 .213
CHATEL (G.).
Les embranchements particuliers.
Paris (5e), Librairie Dalloz, 11, rue Soufflot. Un volume (14 × 22.5), 244 pages. (Prix : 25 francs.)

1930 — 656 .1 (.494) & 656 .2 (.494)
Chemins de fer fédéraux et automobiles.
Berne, A. Francke, S. A. Un volume (18 × 25 cm.), 148 pages. (Prix : 2 fr. suisses.)

1931 — 621. (06
Comptes rendus du Congrès international de mécanique générale (Liége, 1930).
Liége, Secrétariat du Congrès, Institut de mécanique, 32, boulevard de la Constitution. Trois volumes, ensemble plus de 700 pages. (Prix des 3 volumes : 350 francs.)

1931 — 385 .113 (.44)
GODFERNAUX (R.).
Les Grands Réseaux de Chemins de fer français, année 1930.
Paris (6e), Dunod, 92, rue Bonaparte. Manuel de poche (12 × 18). (Prix : 9 francs.)

1931 — 669
GRARD (Général C.) & COURNOT (C.).
Métaux et alliages.
Paris (6e), Librairie Berger-Levrault, 5, rue Auguste-Comte. Trois volumes (16 × 25). (Prix : 120 francs.)

1931 — 669
GUILLET (L.).
Trempe, recuit, revenu.
Paris, Dunod, 92, rue Bonaparte. Un volume, 490 pages, 104 planches et 277 figures. (Prix : 170 francs.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH in the number for November, 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1931 721 .9
KOUZNETZOFF (V. L.)
Exemples pratiques de **dispositions d'armatures dans les ouvrages en béton armé.**
Paris (6e), Dunod, 92, rue Bonaparte. Un fascicule in-4°, 45 planches. (Prix : 36 francs.)

1931 669 & 691
MARCOTTE (E.).
Les matériaux des constructions civiles et des travaux publics. Tome III : **métaux, bétons, revêtements routiers.**
Paris, Gauthier-Villars & Cie. Un volume, 422 pages, 191 figures. (Prix : 80 francs.)

1931 624
PILPOUL (J.).
L'esthétique des ponts.
Paris (9e), Moniteur des Travaux publics, 23, rue de Châteaudun. Un volume, 130 pages, 250 photographies. (Prix : 30 francs.)

1931 62. (01
Premières communications de la nouvelle **Association internationale pour l'essai des matériaux.**
Zurich, Secrétariat général de l'Association, Léonhardstrasse, 27. Quatre volumes, 45 mémoires. Volume B : Matières inorganiques non métalliques, 282 pages, 37 mémoires. Volume C : Matières organiques, 224 pages, 32 mémoires. Volume D : Questions d'ordre général, 247 pages, 33 mémoires. (Prix : les 4 volumes : 12 dollars. 1 volume séparément : 6 dollars.)

1931 624 .2
ROGER (P.).
Calcul des poutres supportant les planchers et certaines charges particulières.
Paris (6e), Dunod, 92, rue Bonaparte. Un volume, 180 pages, 62 figures. (Prix : 52.25 francs.)

1931 625 .6 (06 (.438), 625 .62 (06 (.438) & 656 .1 (06 (.438)
XXIIme Congrès international de tramways, de chemins de fer d'intérêt local et de transports publics automobiles, Varsovie, 29 juin-6 juillet 1930. **Comptes rendus détaillés.**
Bruxelles, Union internationale de tram., ch. de fer d'intérêt local et de transports publics automobiles, 112, rue du Trône. Un volume de 752 pages, tableaux, schémas, cartes et figures.

In German.

1930 624
Berechnungsgrundlagen für massive Brücken.
Berlin, Verlag von Wilhelm Ernst & Sohn. (Preis, geh. : 1.50 R.M.)

1931 621 .13 (09 (.43)
Die **Entwicklung der Lokomotive** im Gebiete des Vereins Deutscher Eisenbahnverwaltungen.
München und Berlin, R. Oldenbourg, 1 Band, 446 Seiten mit 706 Abbildungen und 1 Tafelband mit 39 Tafeln. (Preis zus. : 45 R.M.)

1931 621 .134
Die Lokomotivdampfmaschine.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk Fils, rue des Paroissiens. 1 Band, 104 Seiten mit Abbildungen. (Preis : 2.50 R.M.)

1931 656 .1 (.43) & 656 .2 (.43)
Eisenbahn und Kraftwagen.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk Fils, rue des Paroissiens. 1 Band, 182 Seiten. (Preis : 9 R.M.)

1931 625 .6
Grundzüge für den Bau und den Betrieb der Lokalbahnen.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk, Fils, rue des Paroissiens. 1 Band. 114 Seiten, 13 Abbildungen. (Preis : 10 R.M.)

1931 621 & 621 .392
HAAS (K.).
Maschinenbau. Ges. und hrsg. vom Fachausschuss für Schweisstechnik im Verein dt. Ingenieure und von d. dt. Gesellschaft für Elektroschweissung.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 97 Seiten und Abbildungen. (Preis : 14.50 R.M.)

1931 385. (02 (.43) & 625 .6 (02 (.43)
Handbuch für die **Beschaffungsstellen** der **Reichs-, Privat- und Kleinbahnen.**
Leipzig, Johann Ambrosius Barth und Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 476 Seiten. (Preis : 10 R.M.)

1931 62. (02
« HÜTTE ».
Des Ingenieurs Taschenbuch.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk, Fils, rue des Paroissiens, 1 Band, 1199 Seiten mit Daumeneinschnitten und 970 Textabbildungen. (Preis : 17.50 R.M.)

1930 656 (.43)
LEIBBRAND (M.), Reichsbahndirektor.
Fortschritte und Probleme in der Rationalisierung des Reichsbahnbetriebes.
Berlin, Verlag der Verkehrswissenschaftlichen Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn.

1931 385 .1 (.43)
MOLL (Bruno), Dr. phil.
Die Finanzpolitik der Reichsbahn. Dargestellt auf Grund der Ergebnisse der ersten Periode des Bestehens der Deutschen Reichsbahn-Gesellschaft (1924-1929).
Leipzig, Akademische Verlagsgesellschaft m. b. H.

1931 351 .812 .4 (.43)
NEHSE (H.), Geheimer Reg.-Rat.
Die Privatgleisanschlüsse der Reichsbahn in rechtlicher Hinsicht.
Berlin, Verlag der Verkehrswissenschaftlichen Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn. 1 Band, 265 Seiten. (Preis : 12.50 R.M.)

1931 385 (.43)

SARTER (Ad.), Dr. jur., und KITTEL (Th.), Dr. jur.

Die Deutsche Reichsbahngesellschaft, nach dem Reichsbahngesetz, der Gesellschaftsatzung, dem Reichsbahnpersonalgesetz und aus der Praxis bearbeitet.

Berlin, Verlag der Verkehrswissenschaftlichen Lehrmittel-Gesellschaft bei der Deutschen Reichsbahn-Gesellschaft m. b. H. 1 Band, 362 Seiten. (Preis : 12.50 R.M.)

1931 624

SCHAU (A.).

Der Brückenbau. Leitfaden für den Unterricht an die Tiefbauabteilungen der Baugewerkschulen und verwandten technischen Lehranstalten.

Leipzig, Johann Ambrosius Barth und Brüssel, Falk. Fils, rue des Paroissiens. 1 Band, 218 Seiten, 6 Tafeln und 353 Abbildungen. (Preis : 6.60 R.M.)

1931 624 .2

STAACK (J.).

Rahmen und Balken.

Leipzig, Johann Ambrosius Barth und Brüssel, Falk. Fils, rue des Paroissiens. 1 Band, 281 Seiten mit mehr als 1 000 Rahmen- und über 300 Balken-Belastungsfällen sowie 448 Abbildungen. (Preis : 19 R.M.)

1931 621 .133 .7

STUMPER (R.)

Speisewasser und Speisewasserpflege.

Berlin, W. 9., J. Springer. 1 Band, 171 Seiten mit 84 Abbildungen. (Preis : 9.60 R.M.)

1931 691

VEREIN DEUTSCHER EISENHÜTTENLEUTE.

Taschenbuch für **Entwurf, Berechnung und Ausführung von Stahlbauten.**

Düsseldorf, Verlag Stahleisen m. b. H. und Berlin (W. 9.), Julius Springer. 1 Band, 762 Seiten. (Preis : 12 R.M.)

1931 691

WALZ (K.).

Die heutigen Erkenntnisse über die Wasserdurchlässigkeit des Mörtels und des Betons.

Leipzig, Johann Ambrosius Barth und Brüssel, Falk. Fils, rue des Paroissiens. 1 Band, 92 Seiten mit 18 Textabbildungen und 11 Zusammenstellungen. (Preis : 9 R.M.)

In English.

1931 691

A century of wood preserving.

A group of papers showing the development of wood preserving, especially creosoting.

Edited by Sir Harold Boulton. London, Philip Allan & Co., 150 p. (Price : 8 sh. 6 d.)

1931 656 .227. (02

AEBY (Jules).

Dangerous goods (first supplement).

Published by the author at 29, Avenue della Faille, Antwerp. 96 pages. Boards. (Price : 12 sh.)

1931 656 .223 .2

AUBREY WOOD (L.).

Union-management cooperation on the railroads (chiefly as applied to the maintenance of mechanical equipment).

London (W. 1), Ed. Arnold & Co., 41, Maddox street. Cloth, 6 × 9 inches, 326 pages. (Price : $ 4.)

1931 621 .116

BASSETT (H. N.).

The chemical technology of steam-raising plant.

London (W. 1), Ed. Arnold & C°., 41, Maddox street. (Price : 12 sh. 6 d.)

1931 016 .621 (06

British power and fuel bulletin.

London, British National Committee, World Power Conference, 63, Lincoln's Inn Fields, W. C. 2. 20 pages (8.5 × 5.5 inches).

1931 625 .122

Proceedings of the American Railway Bridge and Building Association; 1930. **Concrete crib retaining-wall construction.**

Masonry failures and repairs, the programming of railway bridge maintenance and the maintenance of tanks and turntables are other subjects. Chicago, T. A. Lichty, secretary, 319, North Waller Avenue. (Price : $ 2.)

1931 526

DAVIS (Raymond, T.), FOOTE (Francis, S.) & RAYNER (W. H.)

Elements of surveying.

New York and London. McGraw-Hill Book C°. Flexible (5 × 8 inches), 581 pages, tables and line cuts. (Price : $. 4.)

1931 016 .385 .1 (.73)

Descriptive list of Bureau publications, March, 1931.

List of publications of the Bureau of Railway Economics now available on request, preceded by a brief sketch of the origin and work of the Bureau.

Washington, D. C., Bureau of Railway Economics, 8 pages.

1931 656 .23 (.42)

FARRAR (M. F.).

How to make the British Railways pay. An economic survey. With a foreword by J. H. Jones, M. A.

London, Sir Isaac Pitman & Sons Ltd., Parker Street, Kingsway, W. C. 2, 82 pages. (Price : 3 sh. 6 d. net.)

1931 694

GARRATT (George A).

The mechanical properties of wood.

Including a discussion of the factors affecting the mechanical properties, working stresses for structural timber, and methods of timber testing.

New York, John Wiley & Sons. Inc. London, Chapman and Hall, Ltd Cloth, (6 × 9 inches), 275 pages fine cuts and halftones. (Price : $ 3.50.)

1931 621 .9 & 669 .1

GROSSMANN (Marcus A) & BAIN (Edgar C.).

High-speed steel.

New York. John Wiley and Sons, Inc. London, Chapman and Hall, Ltd. (Price : 17 sh. 6 d. net.)

1931 621 .8

HAVEN (George B) & SWETT (George W.).

Treatise in leather belting.

New York, American Leather Belting Association, 41, Park Row. Cloth, (5 × 8 inches), 249 pages. tab. and illustrations. (Price : $ 1.50.)

1931 62. (01 (063 (.73)

Index to American Society for Testing Materials standards and tentative standards.

Philadelphia, Pa., American Society for Testing Materials, 1 315, Spruce Street. 1 volume (6 × 9 inches), 114 pages.

1931 624

KRIVOSHEIN (G. G.).

Simplified calculation of statically indeterminate bridges.

With appendix, exact theory of three-span suspension bridges.

Published in English by the author, Bubenec, Buckova, 27, Prague, Czechoslovakia. Also may be had in Czecho from Ceska matice technicka v. Praze (Technical Publishing Society in Prague). Cloth; (7 × 10 inches), 291 pages; — line cuts, pen-and-ink sketches and halftones. (Price : $ 5 postpaid for the edition in English.)

1931 62. (01

LAURSON (Ph. G.) & COX (W. J.).

Properties and mechanics of materials.

New York, John Wiley & Sons, Inc. & London, Chapman & Hall, Ltd. 1 volume (6 × 9 in.), 353 pages, tables and graphs. (Price : $ 3.50.)

1931 385 .3 (.73)

LOCKLIN (Philip D.).

Railroad regulation since 1920, 1931 supplement.

New York, McGraw Hill Book Company, Inc. Supplied to purchasers of book, price of which is $ 2.50.

1931 51. (08

Molesworth's pocket book of engineering formulæ. Thirtieth edition.

Edited by A. P. Thurston. D. Sc. London. E., and F. N. Spon, Ltd., 57, Haymarket, S. W. 1. (Price : 6 sh. net.)

1931 66. (02

MULLER (Dr. E.).

Laboratory manual of electrochemistry.

Translated from the fourth edition by H. J. T. Ellingham, Ph. D., & c.

London, George Routledge & Sons, Ltd., 68-74, Carter-lane, E. C. 4. (Price : 15 sh. net.)

1931 385 .1 (.54

NALINAKSHA SANYAL.

Development of Indian Railways.

Calcutta, University Press, 1 volume (61/4 × 9 3/ in.), 397 pages. (Price : not stated.)

1931 621 .2 & 621 .3

National aspects of water-power development.

A review of the facts, by the National Water Po licies Committee.

Washington, D. C., Chamber of Commerce of the United States. Paper (8 × 10 inches), tables and lin (Price : $ 1.)

1931 625 .25 (06 (.73

Proceedings of the Air Brake Association.

New York, C. L. Burton, secretary, Room 560 Grand Central Terminal building. (5 × 8 1/2 inches 360 pages.

1931 385. (061.4

Program, thirty-second annual convention of Amer can Railway Engineering Association, with list members.

Chicago, Illinois, American Railway Engineering A sociation. 1 volume, 136 pages.

1931 656 .1 & 656

Rails and roads.

« Recommendations of the Interstate Commerc Commission as to effective coordination with railroa service and proper regulation of commercial transpo tation made by the Association of Railway Execu tives. »

Washington, D. C., Association of Railway Execu tives.

1931 385 .1 (.73

Regulation of stock ownership in railroads, part I-III.

Washington. D. C.; U. S. Government Printing Of fice, 3 vols. (Price : $ 1.65.)

1931 621. (06

Second World Power Conference, Berlin 1930.

Berlin, N. W. 7., V. D. I-Verlag G. M. B. H. 1 volum (6 1/2 × 9 1/2 inches), 264 pages.

1931 3

SILLCOX (Lewis B.)

The changing conditions of transportation an commerce. Why the change and the problems evolv ing therefrom. Lecture at Penn State, 27 March, 193

New York City and Watertown, New York A Brake Co., 28 pages.

1931 313 : 385 .112 (.73

Statistical summary of investment and operatin figures reported in questionnaire by class II an class III steam railways, electric railways and carrie by water, subject to the Interstate Commerce Act.

Washington (D. C.), Interstate Commerce Commis sion. 12 sheets.

1931 621 .135 .2 & 625 .214

TEWART (J. C.).

Views and reviews of the hot-box situation.

Denver, Colo., Trade Educational Bureau, Brotherood of Railway Carmen, 2275 South Lincoln Avenue. volume (4 1/2 × 6 inches) 65 pages. (Price : cents.

1931 62 . (01 & 625 .142 .1

Strength tests of creosoted Douglas fir railway ties.

Ottawa, Department of the Interior, Canada. Forest rvice, circular N° 29, 15 pages.

1931 62. (01

Tentative methods of procedure for inspection of aterials.

Pittsburg, Pa., National Engineering Inspection Asciation, P. O. Box 1 119. 1 volume (5 × 8 in.) pages.

1931 691

The use of home-grown larch poles for transmission es.

London, Forest Products Research Bulletin, N° 8. M. Stationery Office, 25 pages. (Price : 2 sh. net.)

1931 697

ILLARD (A. C.), KRATZ (A. P.), FAHNESTOCK (M. K.) & KONZO (S.).

Investigation of various factors affecting the ating of rooms with direct steam radiators.

Urbana, University of Illinois. 1 volume, 104 pages, tables. (Price : 55 cents.)

1931 624 .2

WILSON (W. M.).

Laboratory tests of reinforced concrete arches with decks.

Urbana, University of Illinois. 1 volume, 97 pages, 24 tables. (Price : 50 cents.)

In Spanish.

1931 385. (02 (.460) & 625 .62 (.460)

LA TORRE.

Anuario de Ferrocarriles Españoles y Tramvias.

Madrid, Enrique de la Torre, San Vicente Alta, 54. (Precio : 7 pesetas.)

In Italian.

1931 624 .2

BELLUZZI (O.).

Formule per il calcolo dei portali incastrati.

Bologna, Zanichelli, N., 1 volume, 367 pagine con numerose figure. (Prezzo : 80 L.)

1931 69. (02

MASI (F.).

La pratica delle costruzioni metalliche.

Milano, U. Hœpli. 1 volume, 530 pagine, 433 figure, 15 tavole. (Prezzo : 80 lire.)

1931 721 .9

SASSI (G.).

Diagrammi per il calcolo diretto rapido rigoroso delle solette e travi in cemento armato.

Milano, U. Hoepli. 1 volume in-4°, 10 tavole. (Prezzo: 50 lires.)

[016 .385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1931 625. (06 & 656 .1 (06

n. des ponts et chauss., janvier-février, p. 5.

Le VI^me Congrès international de la route (Washing-, octobre 1930). Rapport de la délégation française. 000 mots & fig.)

1931 691

n. des ponts et chauss., janvier-février, p. 178.

ERET (R.). — Encore la finesse du ciment et la antité d'eau de gâchage. (1 500 mots & fig.)

Arts et Métiers. (Paris.)

1931 621 .9

Arts et Métiers, mars, p. 79; avril, p. 120.

EHRET (P.). — Le découpage du fer et de l'acier au chalumeau. (9 700 mots & fig.)

1931 721 .9

Arts et Métiers, avril, p. 139.

FORESTIER (V.). — Les constructions en béton armé (à suivre). (7 000 mots.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1930 385 .61

Bull. de l'Union intern. des ch. de fer, nov.-déc., p. 551.

Unité technique des chemins de fer. (Projet de rédaction établi par l'Union internationale des chemins de fer.) (22 500 mots & fig.)

1931 385 (.47)
Bull. de l'Union intern. des ch. d. fer, janvier, p. 1.
Notions historiques sur la création des **chemins de fer de l'Etat en Lithuanie.** (3 000 mots.)

1931 385 .113 (.44)
Bull. de l'Union intern. des ch. de fer, janvier, p. 6.
Les **chemins de fer exploités par l'Etat français** pendant l'exercice 1929. (12 000 mots.)

1931 385 .113 (.494)
Bull. de l'Union intern. des ch. de fer, janvier, p. 20.
Les **chemins de fer fédéraux suisses** pendant l'exercice 1929. (8 500 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1931 313 .385 (.489)
Bull. des transp. intern. par ch. de fer, février, p. 79.
Statistique des **chemins de fer danois** pour l'exercice 1929-1930. (2 200 mots.)

1931 313 .385 (.43)
Bull. des transp. intern. par ch. de fer, mars, p. 219.
Les **chemins de fer allemands** pendant l'exercice 1929. (1 800 mots.)

1931 313 .385 (.497 .1)
Bull. des transp. intern. par ch. de fer, avril, p. 269.
Les **chemins de fer du royaume yougoslave** pendant l'exercice 1929. (1 000 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1931 691
Bull. techn. de la Suisse romande, n° 6, 21 mars, p. 69.
BOLOMEY (J.). — **Module de finesse** d'Abrams et calcul de l'eau de gâchage des bétons (suite et fin.) (1 800 mots & 5 tableaux.)

1931 62. (01
Bul. techn. de la Suisse romande, n° 8, 18 avril, p. 100; n° 9, 2 mai, p. 112.
BOLLE (L.). — Le problème de la **résistance des matériaux** (à suivre). (6 000 mots.)

1931 625 .173
Bull. techn. de la Suisse romande, n° 9, 2 mai, p. 100.
Dégarnisseuse-cribleuse, système Scheuchzer. (1 800 mots & fig.)

Bulletin technique de l'Union professionnelle des inspecteurs techniques et des chefs de section des chemins de fer belges. (Bruxelles)

1931 385. (09 .3 (.493)
Bull. techn. de l'Union profes. des inspecteurs techn. et des chefs de section des ch. de fer belges, 15 mars, p. 1.
CAMPUS (R.). — **La route ferrée d'aujourd'hui** (suite et fin). (5 000 mots & fig.)

1931 656 .253 (.49
Bull. techn. de l'Union profes. des inspecteurs techn. des chefs de section des ch. de fer belges, 15 ma p. 15.
DEWILDE (J.). — La **signalisation à deux et à tr positions** appliquée aux chemins de fer belges. (13 mots & fig.)

Chronique des transports. (Paris.)

1931 625 .2
Chronique des transports, n° 6, 25 mars, p. 7.
La question de l'**attelage automatique** devant le B reau international du Travail. (1 500 mots.)

1931 385 .113 (.4
Chronique des transports, n° 8, 25 avril, p. 5.
Les **résultats de l'exploitation** de la Compagnie d chemins de fer de Paris à Orléans en 1930. (5 4 mots.)

Génie civil. (Paris.)

1931 621 .133
Génie civil, n° 2535, 14 mars, p. 272.
GREBEL (A.). — Le processus de la **combustion charbon pulvérisé.** (1 500 mots & fig.)

1931 5
Génie civil, n° 2536, 21 mars, p. 285.
MEULEMEESTER (D. de). — Formule généra pour la détermination des **accélérations des organ commandés par came.** (3 000 mots & fig.)

1931 721
Génie civil, n° 2536, 21 mars, p. 299.
Les planchers sans nervures en **béton armé.** (2 3 mots & fig.)

1931 624 .2 (0
Génie civil, n° 2537, 28 mars, p. 323.
MESNAGER (A.). — La **flèche d'une poutre** ne d pend pas de l'effort tranchant. (900 mots & fig.)

1931 621 .134
Génie civil, n° 2537, 28 mars, p. 333.
MARTIN (H.). — L'application aux **locomotives vapeur** des systèmes de distribution à soupapes. (4 50 mots & fig.)

1931 624 .2 (.44
Génie civil, n° 2538, 4 avril, p. 340.
VIERENDEEL (A.). — Essais du **pont de l'Escar pelle,** système Vierendeel sur la ligne de Douai à Lill (1 400 mots & fig.)

1931 624 .63 (.493
Génie civil, n° 2539, 11 avril, p. 376.
TASHJIAN (E. H.). — Le nouveau **pont en béto armé** avec revêtement en granit artificiel, sur l'Escaut à Eyne (Belgique). (1 500 mots & fig.)

1931 62. (01 & 691
énie civil, n° 2539, 11 avril, p. 426.
CAMPREDON (J.). — Essais de **résistance mécanique des bois** imprégnés aux résines synthétiques. 3 800 mots, 4 tableaux & fig.)

1931 62. (01 & 721
énie civil, n° 2539, 11 avril, p. 451.
RAVIER (L.). — Résultats d'expériences sur la oussée des terres. (2 400 mots & fig.)

1931 62. (01 & 669 .1
énie civil, n° 2539, 11 avril, p. 455.
GUILLET (L.), GALIBOURG (J.) & SAMSOEN M.) — La résistance à chaud des aciers ordinaires. 400 mots et 1 tableau.)

1931 621 .111
énie civil, n° 2539, 11 avril, p. 456.
SELIKIN (R.). — Etude des **mouvements oscillaoires de la vapeur dans les chaudières.** (1 200 mots.)

1931 624 .6
énie civil, n° 2543, 9 mai, p. 468.
VALLETTE (R.). — Calcul et détermination pratique des **arcs.** Courbes et formules donnant les efforts et les sections. (4 600 mots & fig.)

La Science et la Vie. (Paris.)

1931 625 .246
a Science et la Vie, avril, p. 331.
BODET (J.). — L'emploi des **métaux légers** rend us économiques les moyens de transport. (3 300 mots fig.)

1931 669 .1
a Science et la Vie, mai, p. 409.
HOULLEVIGNE (L.). — Voici deux **nouveaux alliages** d'une dureté jusqu'ici inconnue. (5 000 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1931 625 .216. (04
es chemins de fer et les tramways, mars, p. 44.
L'attelage **automatique** devant le Bureau international du Travail. (1 500 mots.)

1931 621 .132 .6 (.44) & 621 .132 .7 (.44)
es chemins de fer et les tramways, mars, p. 46.
Locomotives-tenders de manœuvres à cinq essieux ouplés de la Compagnie du Chemin de fer du Nord. 600 mots & fig.)

1931 621 .132 .5 (.73)
es chemins de fer et les tramways, mars, p. 48.
SPIESS (E). — **Locomotives à marchandises** pour ains lourds aux Etats-Unis. Locomotive à vapeur 5-2 du Chesapeake & Ohio Railroad. (7 200 mots fig.)

1931 656 .212 .8
Les chemins de fer et les tramways, mars, p. 53.
DUCHESNOY. — Les **nouveaux ponts bascules** « Reform » pour le pesage des wagons de chemins de fer. (2 600 mots & fig.)

1931 656. 259
Les chemins de fer et les tramways, mars, p. 55.
Pédale de signalisation fonctionnant par la flexion du rail. (1 800 mots & fig.)

1931 625 .144 .4
Les chemins de fer et les tramways, mars, p. 59.
CROZET (A.). — **Machine spéciale à scier et à percer les rails.** (700 mots & fig.)

1931 621 .132 .3 (.44)
Les chemins de fer et les tramways, avril, p. 63.
L'introduction des **locomotives compound** sur les chemins de fer du Paris-Lyon-Méditerranée. (27 000 mots.)

1931 621 .132 .8 (.45) & 621 .43 (.45)
Les chemins de fer et les tramways, avril, p. 65.
Locomotive Diesel des chemins de fer italiens à transmission directe Ansaldo. (2 800 mots & fig.)

1931 621 .33 (.492)
Les chemins de fer et les tramways, avril, p. 67.
La **traction électrique** sur les chemins de fer néerlandais. (4 400 mots & fig.)

1931 656 .1 (.42) & 656 .2 (.42)
Les chemins de fer et les tramways, avril, p. 70.
BOURGAIN (A.). — Un **nouveau véhicule** : Le Rorail. (4 000 mots & fig.)

1931 625 .253
Les chemins de fer et les tramways, avril, p. 76.
Dispositif pour le séchage de l'air des **freins à air.** (2 300 mots & fig.)

1931 625 .162
Les chemins de fer et les tramways, avril, p. 78.
Dispositif de sûreté applicable aux barrières des **passages à niveau.** (1 900 mots & fig.)

1931 625 .144
Les chemins de fer et les tramways, avril, p. 80.
Tirefonneuse mécanique à main. (1 800 mots & fig.)

1931 625 .234
Les chemins de fer et les tramways, avril, p. 81.
Aérateur-ventilateur de voitures de chemins de fer. (500 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1931 621 .132 .8 (.4) & 621 .335 (.4)
L'Ind. voies ferrées et transp. autom., février, p. 57; mars, p. 90.
LO BALBO (P.). — **Automotrices électriques à accumulateurs** en Europe. (17 000 mots & fig.)

Revue de l'Ecole polytechnique. (Bruxelles.)

1931 **62. (01 & 721. 9**
Revue de l'Ecole polytechnique, mars, p. 251.
HERINCKX (P.). — Calcul graphique des **tensions tangentielles** dans les pièces fléchies en béton armé. (1 000 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1931 **625 .144**
Revue générale des chemins de fer, mars, p. 303.
TETTELIN. — Note sur une **substitution de voies** principales avec engins mécaniques (suite). (3 800 mots & fig.)

1931 **351 .711 (.44)**
Revue générale des chemins de fer, mars, p. 312.
PIOT (G.). — Utilisation de l'**espace aérien** au-dessus des voies ferrées aux abords des grandes gares de Paris. (7 500 mots.)

1931 **313 .385 (.44)**
Revue générale des chemins de fer, mars, p. 323.
RASCLE. — Documents de base utilisés par les Chemins de fer du Midi pour l'élaboration des **statistiques commerciales.** (4 500 mots & fig.)

1931 **385 (.71)**
Revue générale des chemins de fer, mars, p. 333.
Les progrès des chemins de fer canadiens. (3 700 mots.)

1931 **385 .113 (.41)**
Revue générale des chemins de fer, mars, p. 338.
Les **résultats d'exploitation** des chemins de fer d'Irlande. (3 000 mots.)

1931 **656 .222 .5 (.4 + .5)**
Revue générale des chemins de fer, mars, p. 342.
Les **horaires** 1931-1932. (1 700 mots.)

1931 **621 .132 .8 & 621 .43**
Revue générale des chemins de fer, mars, p. 351.
Locomotives Diesel. (1 500 mots.)

1931 **625 .173 (.44)**
Revue générale des chemins de fer, avril, p. 385.
PATTE (M.). — Note sur une **réfection de voie** principale avec engins mécaniques. (3 600 mots & fig.)

1931 **621 .138 .2 (.44)**
Revue générale des chemins de fer, avril, p. 395.
HEMERY. — Appareil automatique pour la **distribution du charbon aux locomotives.** (1 400 mots & fig.)

1931 **625 .2 (06 (.493)**
Revue générale des chemins de fer, avril, p. 399.
LASSON. — **Le matériel de chemin de fer** à l'Exposition internationale de Liége 1930. (12 600 mots & fig.)

1931 **621 .132 .8 (.44**
Revue générale des chemins de fer, avril, p. 428.
Emploi de la double expansion dans les locomotive de la Compagnie des chemins de fer Paris-Lyon-Médi terranée. (7 700 mots.)

1931 **385 .113 (.48)**
Revue générale des chemins de fer, avril, p. 440.
Les **résultats d'exploitation** des chemins de fer des Etats scandinaves. (8 700 mots.)

1931 **625 .242 (.44)**
Revue générale des chemins de fer, mai, p. 32.
COLLIN (G.). — Note sur un **essai de tombereaux** métalliques en tôles soudées. (1 600 mots & fig.)

1931 **725 .31 (.44)**
Revue générale des chemins de fer, mai, p. 495.
BROSSARD & SORGUES. — Note sur la **construction des nouveaux bureaux** de la Compagnie Paris-Lyon-Méditerranée, rue Traversière, à Paris. (10 000 mots & fig.)

1931 **625 .232 (.44)**
Revue générale des chemins de fer, mai, p. 521.
TÊTE. — Nouvelles **voitures métalliques à bogies** du réseau Paris-Lyon-Méditerranée contenant dix compartiments-couchettes à deux places avec meuble-toilette. (2 000 mots & fig.)

1931 **656 .212 .5**
Revue générale des chemins de fer, mai, p. 542.
Conférence sur l'**organisation des gares de triage.** (2 300 mots & fig.)

1931 **621 .132 .7 (.494) & 621 .43 (.494)**
Revue générale des chemins de fer, mai, p. 542.
Locomotives Diesel pour manœuvres. (1 400 mots & fig.)

Revue politique et parlementaire. (Paris.)

1931 **656 (.47)**
Revue politique et parlementaire, 10 avril, p. 64.
DE GOULÉVITCH (A.). — Du passé à l'avenir des **transports en Russie.** (5 400 mots.)

Revue universelle des Mines. (Liége.)

1931 **721 .4**
Revue universelle des mines, n° 9, 1er mai, p. 249.
THOMAS (P.). — **Calcul des arcs** à membrures multiples indépendantes. (2 200 mots & fig.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1930 **656 .23 (0**
Archiv für Eisenbahnwesen, Nov.-Dez., S. 1497.
SPIESS (Dr. W.). — **Tarif** eine enzyklopädische Studie. (Schluss.) (6 000 Wörter.)

1930 **347 .763 (.42 & 656 .1 (.42)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1513.
HEYER (F.). — Das neue britische **Automobilgesetz.**
4 400 Wörter.)

1930 **313 .385 (.489)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1599.
THOMSEN. — Die **Eisenbahnen in Dänemark** in den
etriebsjahren 1927-28 und 1928-1929. (Tabellen.)

1930 **313 .385 (.481)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1611.
THOMSON. — Die **Eisenbahnen in Norwegen** in den
ahren 1927-28 und 1928-29. (Tabellen.)

1930 **313 .385 (.47)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1624.
ROESNER (Dr. E.). — Die **Staatsbahnen in Litauen**
m Jahr 1928. (1 400 Wörter & Tabellen.)

1930 **313 .385 (.47)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1632.
Die **Lettländischen Eisenbahnen** im Wirtschaftsjahr
928-29. (800 Wörter & Tabellen.)

1930 **313 .385 (.41)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1649.
Die **Eisenbahnen Irlands** 1927 und 1928. (Tabellen.)

1930 **313 .385 (.498)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1662.
Die **rumänischen Staatsbahnen** in den Jahren 1927
and 1928. (Tabellen.)

1930 **621 .33 (.481)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1675.
Stand der **Elektrisierung** in Norwegen. (800 Wörter.)

1930 **385. (01 (.63)**
rchiv für Eisenbahnwesen, Nov.-Dez., S. 1679.
Die **franko-äthiopische Eisenbahn** Djibouti-Addis
Abeba. (1 000 Wörter, 1 Karte & Tabellen.)

1931 **313 .385 (.3)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 1.
Die **Eisenbahnen der Erde** im Jahr 1928. (400 Wörter
& Tabellen.)

1931 **385 (.498)**
Archiv für Eisenbahnwesen, Januar-Februar. S. 12.
Dr. SAUTER. — Bericht über die Ausführung des
**Programms zur Sanierung (« Verbesserung ») der Ru-
mänischen Bahnen.** (6 500 Wörter.)

1931 **625 .6 (.431)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 127.
Kleinbahnen in Preussen. (800 Wörter & Tabellen.)

1931 **385. (09 (438)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 133.
Dr. Maria CREMER. — **Zur Lage des polnischen
Eisenbahnwesens.** Die wirtschaftliche **Bedeutung** des
polnischen Güterverkehrs. (12 000 Wörter & Tabellen.)

1931 **313. 385 (.43)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 183.
Die **Eisenbahnen des Deutschen** Reichs 1928. (Tabel-
len.)

1930 **313 .656 .225 (.43)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 209.
Die **Güterbewegung** auf deutschen Eisenbahnen im
Jahr 1928. (5 500 Wörter & Tabellen.)

1931 **385. (01 (.67)**
Archiv für Eisenbahnwesen, Januar-Februar, S. 247.
Die **Kenya- und Ugandabahn.** (1 000 Wörter, Tabel-
len & 1 Karte.)

1931 **313 .385 (.497.1**
Archiv für Eisenbahnwesen, März-April, S. 311.
Dr. Ing. REMY. — Die **südslavischen Eisenbahnen**
1927 und 1928. (2 500 Wörter & Tabellen.)

1931 **385. (09 (.495 + .496)**
Archiv für Eisenbahnwesen, März-April, S. 401.
DIECKMANN. — Die **Betriebsgesellschaft der Orien-
talischen Eisenbahnen.** (8 000 Wörter, 1 Karte & Ta-
bellen.)

1931 **385. (01 (.66)**
Archiv für Eisenbahnwesen, März-April, S. 448.
Die **Bahnen in Britich-Westafrika.** (2 000 Wörter & 3
Karten.)

1931 **313 .385 (.494)**
Archiv für Eisenbahnwesen, März-April, S. 455.
Die **Eisenbahnen der Schweiz** im Jahr 1928. (Tabel-
len.)

1931 **313 .385 (.494)**
Archiv für Eisenbahnwesen, März-April, S. 465.
Die **Schweizerischen Bundesbahnen** im Jahr 1929.
(300 Wörter & Tabellen.)

1931 **313 .385 (.71)**
Archiv für Eisenbahnwesen, März-April, S. 472.
Dr. VOIGT. — Die **canadischen Staatsbahnen** im
Jahr 1929. (2 000 Wörter & Tabellen.)

1931 **313 .385 (.52)**
Archiv für Eisenbahnwesen, März-April, S. 484.
Die **Eisenbahnen Japans** im Rechnungsjahr 1927-28.
(Tabellen.)

Elektrische Bahnen. (Berlin.)

1931 **621 .335 (.44)**
Elektrische Bahnen, Februar, S. 33.
JAPIOT (M.). — Die **elektrischen Schnellzuglokomoti-
ven** der Eisenbahn-Gesellschaft Paris-Lyon-Méditerra-
née. (Fortsetzung folgt.) (7 000 Wörter & Abb.)

1931 **656 .215**
Elektrische Bahnen, Februar, S. 58.
KARBUS (J.). — **Gleisfeldbeleuchtung von Bahnhöfen**
mit elektrischer Fahrleitungsausrüstung. (1 000 Wörter
& Abb.)

1931 621 .335 (.45)
Elektrische Bahnen, März, S. 65; April, S. 103.
SACHS (K.). — Neuere **Gleichstromlokomotiven** der Italienischen Staatsbahnen. (Fortsetzung folgt.) (11 700 Wörter & Abb.)

1931 621 .132 .8 (.43)
Elektrische Bahnen, März, S. 76.
NORDEN. — **Speicherschlepper für Rangierdienst** der Deutschen Reichsbahn. (1 900 Wörter & Abb.)

1931 621 .335 (.44)
Elektrische Bahnen, März, S. 80.
JAPIOT (M.). — Die **elektrischen Schnellzuglokomotiven** der Eisenbahn-Gesellschaft Paris-Lyon-Méditerranée. (7 500 Wörter & Abb.)

1931 621 .335 (.52)
Elektrische Bahnen, März, S. 88.
BALKE (H.). — **Elektropneumatische Steuerungen** mit Nutzbremsung für die Triebwagen Koyasan-Denki-Tetsudo (Japan). (3 000 Wörter & Abb.)

1931 621 .33 (01
Elektrische Bahnen, April, S. 97.
HRUSCHKA (A.). — **Kritische Vorschläge über die Benennung** von Betriebsgrössen, Maschinenleistungen, Bewegungswiderständen und Zugkräften im Eisenbahnbetriebe. (7 000 Wörter & Abb.)

1931 621 .335 (.436)
Elektrische Bahnen, April, S. 117.
LINSINGER (E.). — **I Do I Schnellzugslokomotive** Reihe 1670 der Oesterreichischen Bundesbahnen. (Fortsetzung folgt.) (4 500 Wörter & Abb.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 625 .4 (.43)
Elektrotechnische Zeitschrift, Heft 13, 26, März, S. 413.
Die **Untergrundbahn** Alexanderplatz-Friedrichsfelde in Berlin. (2 500 Wörter & Abb.)

1931 621 .31 & 621 .43
Elektrotechnische Zeitschrift, Heft 19, 7. Mai, S. 601.
SCHNEIDER (R.) & SCHNAUS (G.). — Schema einer Wirtschaftlichkeitsrechnung für den Vergleich von **Dieselmotor** und **Elektromotor**. (5 000 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1931 621 .131 .3
Glasers Annalen, Heft 5, 1. März, S. 46.
GÜNTHER (K.) & SOLVEEN. — Neue Einrichtungen und Methoden zur **wissenschaftlichen Untersuchung von Lokomotiven** und ihren Einzelteilen. (28 400 Wörter & Abb.)

1931 625 .2 (0
Glasers Annalen, Heft 5, 1. März, S. 76.
SPEER (P.). — Einfluss der Bauart und des Zustandes der **Personenwagen** auf ihren Lauf. (27 600 Wörter & Abb.)

1931 625 .23 (
Glasers Annalen, Heft 5, 1. März, S. 99.
NOCON. — Neue Versuche über den **Fahrwiderstan[d]** von Personen- und D-Zugwagen. (20 000 Wörter & Abb.)

1931 625 .25
Glasers Annalen, Heft 5, 1. März, S. 122.
HILDEBRAND (W.). — Eine neue **Druckluftbrems[e]** für Güterzüge, Personen- und Schnellzüge. (7 700 Wörter & Abb.)

1931 621 .133 .
Glasers Annalen, Heft 6, 15. März, S. 129.
JULIUSBURGER (P.). — **Abdampfvorwärmer un[d] Abdampfinjektor.** (11 000 Wörter & Abb.)

1931 621 .131 .3 & 621 .134 .
Glasers Annalen, Heft 7, 1. April, S. 145.
ACHTERBERG (Th.). — Ueber die rechnerische Vorausbestimmung der günstigsten Fahrgeschwindigkei[t] von **Kolbenheissdampflokomotiven** einstufiger Dampfdehnung. (3 300 Wörter & Abb.)

1931 621 .392
Glasers Annalen, Heft 8, 15. April, S. 149.
SANDELOWSKY (S.). — Neue Erkenntnisse und Fortschritte bei der Anwendung der **Radsatz-Auftragsschweissung.** (3 800 Wörter & Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 62. (01
Zeitschrift des Vereines Deutscher Ingenieure, Nr. 10, 7. März, S. 285.
KUNTZE (W.). — **Struktur, Festigkeit, Stetigkeit.** (3 800 Wörter & Abb.)

1931 621 .43
Zeitschrift des Vereines Deutscher Ingenieure, Nr. 10, 7. März, S. 326.
ORANGE (P. L'). — Die Zusammenarbeit von Pumpen und Düsen bei kompressorlosen **Dieselmotoren.** (2 600 Wörter & Abb.)

1931 625 .5 (.433)
Zeitschrift des Vereines Deutscher Ingenieure, Nr. 12, 21. März, S. 341.
BASCHWITZ (E. F.). — Die **Bayerische Zugspitzbahn.** Planung und Bauausführung. (5 600 Wörter & Abb.)

1931 625 .5 (433)
Zeitschrift des Vereines Deutscher Ingenieure, Nr. 13, 28. März, S. 393.
BASCHWITZ (E. F.). — Die **Bayerische Zugspitzbahn.** Betriebsmittel. (4 200 Wörter & Abb.)

1931 62. (01 (.43 & 621 .392 (.43)
Zeitschrift des Vereines Deutscher Ingenieure, Nr. 13, 28. März, S. 399.
KANTNER (C.). — **Röntgenprüfanlagen für Werkstoffe** der Deutschen Reichsbahn-Gesellschaft in der Schweisstechnischen Versuchsabteilung des Reichsbahn-Ausbesserungswerkes Wittenberge. (1 400 Wörter & Abb.)

1931 621 .3 (.435)

eitschrift des Vereines Deutscher Ingenieure, Nr. 16, 18. April, S. 487.

MATTERSDORFF (W.). — Fortschritte der Auto-atik im Betriebe der Hamburger Hochbahn. (3 800 Wörter & Abb.)

1931 62. (01 & 69 (01

eitschrift des Vereines Deutscher Ingenieure, Nr. 18, 2. Mai, S. 537.

GRAF (O.). — Über die Prüfung der Werkstoffe. rundsätzliches und neuere Forschungsergebnisse. (5 300 Wörter & Abb.)

In English.

Commerce Reports. (Washington.)

1931 385 .1 (86)

ommerce Reports, n° 15, 13 April, p. 110.

DONNELLY (W. J.). — Colombian National Rail-ays to be placed on **commercial basis.** (1 300 words.)

Electric Railway Journal. (New York.)

1931 385 .51

lectric Railway Journal, April, p. 176.

HALL (E. K.). — Securing **the co-operation of the mployee.** (1 600 words & fig.),

1931 385 .56 (.73)

Electric Railway Journal, April, p. 179.

MILLER (J. A.). — **Employment conditions stable in he electric railway industry.** (2 100 words.)

1931 625 .26 (.73) & 725 .33 (.73)

Electric Railway Journal, April, p. 182.

New **shop facilities** for Lackawanna electric trains. 1 400 words & fig.)

1931 625 .26 (.73) & 725 .33 (.73)

Electric Railway Journal, April, p. 185.

Car and bus maintenance co-ordinated at Baltimore. 2 700 words & fig.)

1931 621 .332 (.73)

Electric Railway Journal, April, p. 189.

BIRCH (L. W.). — Many factors affect cost of **rolley bus overhead.** (2 100 words & fig.)

1931 625 .174 (.73)

Electric Railway Journal, April, p. 193.

Modernized snow fighting methods effective in Chi-ago. (2 700 words & fig.)

1931 385 .113 (.73)

Electric Railway Journal, April, p. 197.

Electric railways carry on in a year beset with lifficulties. (1 500 words, 3 tables & fig.)

1931 625 .26 (.73) & 725 .33 (.73)

Electric Railway Journal, April, p. 201.

Comprehensive **bus maintenance program.** Promotes efficiency in operation at Milwaukee. (3 000 words & fig.)

1931 385 .587 (.73) & 625 .14 (.73)

Electric Railway Journal, April, p. 205.

HOWARD (H. G.). — Scheduling of **track reconstruction.** Reduces labor cost. (1 900 words, 4 tables & fig.)

1931 621 .332 (.73)

Electric Railway Journal, April, 209.

New standard trolley wire of heavy section. (300 words & fig.)

1931 621 .333 & 621 .338

Electric Railway Journal, May p. 240.

BUCK (M.). — Modern improvements in **car truck design** give superior performance. (3 400 words & fig.)

1931 625 .143 .5 (.73)

Electric Railway Journal, May, p. 251.

Tie-boring practices analyzed. (1 800 words.)

1931 621 .338 (.73)

Electric Railway Journal, May, p. 253.

WRIGHT (G. I.). — **Cars** for Reading electrification embody advanced design. (2 600 words & fig.)

1931 385 .113 (.73)

Electric Railway Journal, May, p. 256.

Trend of revenues and expenses (Electric railways). (1 300 words.)

Engineer. (London.)

1931 064 (.82)

Engineer, No. 3923, 20 March, (No. II.) p. 310; No. 3924, 27 March, (No. III.) p. 336; No. 3925, 3 April, (No. IV.) p. 364; No. 3926, 10 April, (No. V.) p. 394; No. 3927, 17 April, (No. VI.) p. 422; No. 3928, 24 April, (No. VII.) p. 450.

Buenos Ayres **trade exhibition.** (English and Spanish texts.) (47 000 words & fig.)

1931 621 .135 .2 (09 .3

Engineer, No. 3923, 20 March, p. 323.

Early **locomotive wheels.** (1 900 words.)

1931 656 .281 (.42)

Engineer, No. 3923, 20 March, p. 323.

The fatal **railway accident** at Carlisle. (500 words.)

1931 064 (.43)

Engineer, No. 3923, 20 March, p. 325.

The **technical fair** at Leipzig. (No. II.) (Conclusion.) (4 200 words & fig.)

1931 609 (06 (.42)

Engineer, 20 March, (No. I.), p. 327; No. 3924, 27 March, (No. II.), p. 340; No. 3925, 3 April, (No. III.), p. 373.

The Institute om Metals. (14 000 words.)

1931 621 .6
Engineer, No. 3924, 27 March, p. 341 & 352.
ALLEN (R. S.). & MILLINGTON. — Modern methods of raising water from underground sources (Institution of Mechanical Engineers.) (To be continued.) (5 400 words & fig.)

1931 625 .258 (.42)
Engineer, No. 3924, 27 March, p. 346.
A new **rail brake.** (1 900 words & fig.)

1931 62. (01 & 669
The Metallurgist, p. 35, supplement to the Engineer, 27 March.
X-rays in metallurgical research. (No. II) (900 words.)

1931 62. (01
The Metallurgist, p. 36, supplement to the Engineer, 27 March.
Magnetic testing. (800 words & fig.)

1931 669
The Metallurgist, p. 37, supplement to the Engineer, 27 March.
Corrosion of boiler plate. (1 900 words.)

1931 62. (01 & 669
The Metallurgist, p. 44, supplement to the Engineer, 27 March.
Fatigue tests on the M. A. N. machine. (1 400 words.)

1931 669 .1
The Metallurgist, p. 46, supplement to the Engineer, 27 March.
The alloys of iron with tungsten. (700 words.)

1931 62. (01 & 669
The Metallurgist, p. 46, supplement to the Engineer, 27 March.
Macro-printing. (700 words.)

1931 624 .3 (.944)
Engineer, No. 3925, 3 April, p. 372.
The construction of the **Sydney harbour bridge.** (2 200 words & fig.)

1931 656 .281 (.42)
Engineer, No. 3925, 3 April, p. 382.
The Leighton Buzzard fatal **railway accident.** (1 400 words & fig.)

1931 621 .87
Engineer, No. 3925, 3 April, p. 383.
A new **mobile crane.** (1 200 words & fig.)

1931 621 .6
Engineer, No. 3925, 3 April, p. 384.
ALLEN (P. I.) & MILLINGTON. — Modern methods of **raising water from underground sources** (Institution of Mechanical Engineers.) (Conclusion.) (3 500 words & fig.)

1931 627 (.71
Engineer, No. 3926, 10 April, p. 400.
Two railway dry docks at Quebec. (1 200 words & fig.)

1931 621 .13 (0 (.43
Engineer, No. 3926, 10 April, p. 401.
Concentration in the German **locomotive industry.** (1 100 words.)

1931 725 .35 (.82
Engineer, No. 3926, 10 April, p. 414.
Buenos-Ayres exhibition — **model grain handling plant.** (1 200 words & fig.)

1931 621 .3
Engineer, No. 3927, 17 April, p. 430.
Modern **transformers and induction regulators.** (3 600 words & fig.)

1931 621 .9 & 669 .1
Engineer, No. 3927, 17 April, 442.
A new **self-tempering chisel steel.** (250 words & figure.)

1931 621 .33 (.42)
Engineer, No. 3928, 24 April, p. 462.
The Weir report on **railway electrification.** (2 000 words.)

1931 621 .65
Engineer, No. 3928, 24 April, p. 464; No. 3929, 1 May, p. 481; No. 3930, 8 May, p. 520.
GIBB (C. D.). — Post-war land **turbine development.** (Paper read before The Institution of Mechanical Engineers, London.) (12 500 words, tables & fig.)

1931 669 .1
The Metallurgist, p. 51, supplement to the Engineer, 24 April.
Nitrogen in mild steel. (1 800 words.)

1931 669 .1
The Metallurgist, p. 53, supplement to the Engineer, 24 April.
The change of volume in steel produced by deformation. (1 000 words & tables.)

1931 669 .1
The Metallurgist, p. 54, supplement to the Engineer, 24 April.
Gas cylinders. (1 300 words, tables & fig.)

1931 62. (01 & 669.1
The Metallurgist, p. 56, supplement to the Engineer, 24 April.
The rapid determination of « **creep** » **strength.** (1 700 words, tables & fig.)

1931 669 .1
The Metallurgist, p. 63, supplement to the Engineer, 24 April.
Alloys of iron with aluminium. (900 words & fig.)

1931 621 .134 .5
Engineer, No. 3929, 1 May, p. 476.
LIVINGSTON SMITH (S.) & GLAISTER (E.). — The effect of use on the properties of **motor oils.** (3 000 words & fig.)

1931 621 .65
Engineer, No. 3929, 1 May, p. 478.
GIBB (C. D.). — Post-war land **turbine** development (Discussion of paper presented before the Institution of Mechanical Engineers, London). (3 000 words.)

1931 621 .33 (.42)
Engineer, No. 3929, 1 May, p. 485.
Main line **electrification.** (2 900 words.)

1931 621 .33 (.42)
Engineer, No. 3929, 1 May, p. 489.
Main line **railway electrification.** (1 900 words.)

1931 656 .212 .6 (.42)
Engineer, No. 3929, 1 May, p. 492.
A 250 ton electric hammerhead **crane.** (1 700 words & fig.)

1931 669 .1
Engineer No. 3929, 1 May, p. 523; No. 3931, 15 May, p. 550.
The **corrosion** of **iron** and **steel.** (4 500 words.)

1931 621 .39 & 621 .133 .7
Engineering, No. 3931, 15 May, p. 532.
TAGG (G. F.). — Electrical determination of **water purity.** (3 500 words & fig.)

1931 669 .1 (06 (.42)
Engineering, No. 3931, 15 May, p. 534.
The Iron and Steel Institute. (To be continued.) (6 000 words.)

1931 621 .33 (.42)
Engineering, No. 3931, 15 May, p. 536.
Electrification of the Manchester-Altrincham Railway. (2 500 words & fig.)

1931 656 .211 .5
Engineering, No. 3931, 15 May, p. 551.
The Voith-Schneider **propulsion system.** (1 500 words & fig.)

Engineering. (London.)

1931 669 (06 (.42)
Engineering, No. 3400, 13 March, p. 365; No. 3401, 20 March, p. 381; No. 3402, 27 March, p. 410.
The **Institute of Metals.** (10 500 words.)

1931 347 .764 (.42) & 388 (.42)
Engineering, No. 3401, 20 March, p. 395.
The London **passenger transport bill.** (1 800 words.)

1931 621 .135 .3 & 625 .213
Engineering, No. 3401, 20 March, p. 405.
BATSON (G. C.) & BRADLEY (J.). — **Fatigue strength of carbon — and alloy — steel plates** as used for laminated springs. (2 400 words, tables & fig.)

1931 721 .9
Engineering, No. 3402, 27 March, p. 409.
The rational **reinforcement of concrete.** (1 200 words & fig.)

1931 697
Engineering, No. 3402, 27 March, p. 415.
The **electric heating** of buildings. (1 100 words.)

1931 621 .134 .3 (.42)
Engineering, No. 3402, 27 March, p. 416.
High pressure four-cylinder compound locomotive for the London & North Eastern Railway. (Concluded.) (1 000 words & fig.)

1931 625 .13 (.54)
Engineering, No. 3402, 27 March, p. 417.
MINNITT (G. C.). — The **reconstruction** of the **Nerbudda bridge** on the Great Indian Peninsula Railway. (900 words.)

1931 621 .6
Engineering, No. 3402, 27 March, p. 435.
ALLEN (R. S.) & MILLINGTON (W. E. W.). — Modern methods of **raising water from underground sources.** (5 800 words & fig.)

1931 624 .2
Engineering, No. 3403, 3 April, p. 468.
HOOGAARD (W.). — A new theory for the **distribution of shearing stresses** in riveted and welded connections. (4 300 words & fig.)

1931 621
Engineering, No. 3404, 10 April, p. 471.
Cylindrical fits. (2 500 words.)

1931 621 .114
Engineering, No. 3404, 10 April, p. 475.
FEARN (E. J.). — The **stresses in piston rings.** (700 words & fig.)

1931 621 .9
Engineering, No. 3404, 10 April, p. 482.
Portable pile driver. (500 words.)

1931 625 .154 (.45) & 656 .212 .6
Engineering, No. 3405, 17 April, p. 508.
30-ton railway **turntable elevator.** (800 words & fig.)

1931 385 .1 (.931)
Engineering, No. 3405, 17 April, p. 509.
The **New Zealand Railways.** (1 300 words.)

1931 621 .392 & 665 .882
Engineering, No. 3405, 17 April, p. 524.
Recent progress in **welding.** (1 500 words.)

1931 625 .258 (.42)
Engineering, No. 3405, 17 April, p. 530.
The Westinghouse eddy-current **rail brake.** (1 300 words & fig.)

1931 **621 .116**
Engineering, No. 3406, 24 April, p. 537.
ROCHEL (K.). — The **Löffler boiler** from the boiler-maker's point of view. (4 400 words & fig.)

1931 **621 .65**
Engineering, No. 3406, 24 April, p. 550.
The **Institute of Mechanical Engineers** (4 300 words.)

1931 **621 .65**
Engineering, No. 3406, 24 April, p. 555; No. 3407, 1 May, p. 587; No. 3409, 15 May, p. 656.
GIBB (C. D.). — Post-war land **turbine development.** (To be continued.) (10 000 words, tables & fig.)

1931 **621 .116**
Engineering, No. 3406, 24 April, p. 557.
Boiler and furnace control instruments. (To be continued.) (3 400 words & fig.)

1931 **621 .33 (.42)**
Engineering, No. 3407, 1 May, p. 577.
Main line railway **electrification.** (2 700 words.)

1931 **621 .65**
Engineering, No. 3407, 1 May, p. 578.
The **steam turbine.** (1 900 words.)

1931 **624 .8 (.71)**
Engineering, No. 3408, 8 May, p. 595 & 613.
Rolling lift bascule bridges; Welland ship canal. (3 800 words & fig.)

1931 **669 .1 (06 (.42)**
Engineering, No. 3408, 8 May, p. 612; No. 3409, 15 May, p. 650.
The **Iron and Steel Institute.** (To be continued.) (7 000 words.)

1931 **624 .63 (.44)**
Engineering, No. 3409, 15 May, p. 644.
Long-span-bridges in reinforced concrete. (900 words.)

1931 **621 .33 (.42)**
Engineering, No. 3409, 15 May, p. 645.
The **electrification** of the Manchester-Altrincham Railway. (2 600 words & fig.)

1931 **669 .1**
Engineering, No. 3409, 15 May, p. 652.
The **corrosion** of iron and steel. (1 800 words.)

Engineering News-Record. (New York.)

1931 **625 .143 .2 (.73)**
Engineering News-Record, No. 12, 19 March, p. 467.
Better **steel rails.** (450 words.)

1931 **62. (01 & 721 .3**
Engineering News-Record, No. 12, 19 March, p. 482.
PRIESTER (G. C.) & SANDBERG (C. H.). — **Strain tests** on steel plates carrying H-section columns. (1 100 words & fig.)

1931 **625 .1 (06 (.73)**
Engineering News-Record, No. 12, 19 March, p. 484.
American Railway Engineering Association has busy two-day meeting. (2 800 words.)

1931 **627 (.73)**
Engineering News-Record, No. 13, 26 March, p. 510.
KNOWLES (A. M.). — Novel pier **shed construction** in New York harbor. (1 900 words & fig.)

1931 **625 .142 .4 (.45)**
Engineering News-Record, No. 13, 26 March, p. 514.
Concrete blocks supplant ties in experimental track. (300 words & fig.)

1931 **721 .1 (.73)**
Engineering News-Record, No. 13, 26 March, p. 515.
GLIEK (G. W.). — **Skyscraper foundations** in quicksand area built within open cofferdam. (3 300 words & fig.)

1931 **62. (01 (06 (.73)**
Engineering News-Record, No. 13, 26 March, p. 529.
American Society for Testing Materials regional meeting at Pittsburgh. (1 700 words & figure.)

1931 **621 .33 (.73) & 625 .1 (.73)**
Engineering News-Record, No. 14, 2 April, p. 550.
Milwaukee's new **rapid-transit railroad.** (1 700 words & fig.)

1931 **624 .3 (.73)**
Engineering News-Record, No. 14, 2 April, p. 553.
K-type bracing for long-span **bridge trusses.** (700 words & fig.)

1931 **625 .3 (.73)**
Engineering News-Record, No. 14, 2 April, p. 555.
Steep incline railway built down side of Royal gorge. (1 000 words.)

1931 **55, 624 .1 & 721 .1**
Engineering News-Record, No. 14, 2 April, p. 570.
Penetration tests give bearing power of deep sub-surface soils. (1 600 words & fig.)

1931 **624**
Engineering News-Record, No. 15, 9 April, p. 592.
The year's progress in the **development** of **construction equipment.** (2 800 words & fig.)

1931 **625 .13**
Engineering News-Record, No. 15, 9 April, p. 601.
MAC DONALD (J. S.). — Equipment's place in **tunneling progress.** (800 words.)

1931 625 .13

ngineering News-Record, No. 15, 9 April, p. 602.

Tunneling equipment. — I. Development of the **rock** rill, by C. H. Vivian.

— II. **Water-handling equipment** for tunnels, by A. H. ORCHARDT.

— III. **Ventilation** during construction, by R. H. RO-ERS.

– IV. **Air compressing equipment** and accessories, by . F. HUVANE. — V. Progress in **tunnel mucking and aulage**, by Daniel J. O' ROURKE. — VI. Evolution f the **concrete lining plant**, by J. H. FITZGERALD. 13 000 words & fig.)

1931 624 .7 (.73)

ngineering News-Record, No. 16, 16 April, p. 642.

ELDRIDGE (C. H.). — **Concrete trusses** and 47-ft at slabs in New-Seattle viaduct. (1 700 words & fig.)

1931 62. (01 & 669

ngineering News-Record, No. 16, 16 April, p. 651.

What we know of **fatigue of metals.** (2 800 words.)

1931 624 .62 (.73)

ngineering News-Record, No. 17, 23 April, p. 676.

McKees rocks and west end **steel arches**, Pittsburgh. 2 700 words & fig.)

1931 624 .63 (.73)

ngineering News-Record, No. 17, 23 April, p. 680.

RICHARDSON (G. S.). — **A concrete arch** of 460-ft oan, Pittsburgh. (2 400 words & fig.)

1931 625 .143. (.73)

ngineering News-Record, No. 17, 23 April, p. 693.

New **splice bar** and **rail sections** (Meeting of American Society of Civil Engineers). (450 words & fig.)

1931 62. (01 & 665 .882 & 669

ngineering News-Record, No. 18, 30 April, p. 729.

HOVEY (O. E.). — New series of **tests on flame-at wind connections.** (1 100 words & fig.)

1931 625 .111 (.73)

ngineering News-Record, No. 18, 30 April, p. 731.

Three-level grade separation at Chicago. (2 200 words & fig.)

1931 721 .3

ngineering News-Record, No. 18, 30 April, p. 735.

ABBARD (N. B.). — Testing full-size **transmission owers.** (1 300 words & fig.)

1931 625 .13 (.54)

ngineering News-Record, No. 19, 7 May, p. 764.

EVERALL (W. C.). — **Rebuilding railway and highway bridge** at Attock, India. (1 400 words & fig.)

Great Western Railway Magazine. (London.)

1931 385 .113 (.42)

reat Western Railway Magazine, April, p. 156.

The annual **general meeting** of the Great Western ailway Company. (9 000 words & fig.)

1931 656 .26 (.42)

Great Western Railway Magazine, May, p. 207.

An interesting adjunct to the **Swindon works.** (1 100 words & fig.)

Institution of Engineers, Australia. (Sydney.)

1931 654 (.94)

Institution of Engineers, Australia, February, p. 41.

CRAWFORD (J. M.). — **Communication engineering** in Australia. (7 500 words & fig.)

1931 621 .13

Institution of Engineers, Australia, February, p. 54.

HARRIS (N. Ch.). — The trend of design of **railway locomotives.** (10 000 words & fig.)

1931 624 .32 (.94)

Institution of Engineers, Australia, March, p. 81.

CHAPMAN (W. D.). — **Reconstruction** of Hawthorn **bridge.** (6 000 words, 3 tables & fig.)

1931 678

Institution of Engineers, Australia, March, p. 95.

CHAPPLE (A. R.). — The properties and manufacture of **rubber.** (6 000 words & fig.)

Journal of the Institute of Transport. (London.)

1931 656

Journal of the Institute of Transport, April, p. 279.

GORDON (H. H.). — The sale of **passenger transport.** (13 000 words & fig.)

1931 347 .763 & 38

Journal of the Institute of Transport, April, p. 294.

MACASSEY (Sir L. L.). — The **relationship of States to transport.** (11 700 words.)

1931 656 .25

Journal of the Institute of Transport, May, p. 326.

BYROM (C. R.). — The effect of signalling on **track capacity** (Paper and discussion). (17 000 words & fig.)

1931 347 .763 (.42) & 656 .1 (.42)

Journal of the Institute of Transport, May, p. 350.

RICHES (H.). — The **Road traffic Act,** 1930. (5 800 words.).

1931 656 .1 & 656 .2

Journal of the Institute of Transport, May, p. 355.

MILLS (G.). — **Railway and road mentality.** (5 000 words.)

Locomotive, Firemen and Enginemen's Magazine. (Cleveland, Ohio).

1931 621 .133 .8 (.73)

Loc. Firemen & Enginemen's Mag., April, p. 281.

PRIOR (J.). — **Loco valve pilot performance.** (4 500 words & fig.)

Mechanical Engineering. (New York.)

1931 621 .165
Mechanical Engineering, April, p. 271.
CHRISTIE (A. G.). — **Trends in steam-turbine development.** (5 200 words & fig.)

1931 536
Mechanical Engineering, April, p. 289.
The second international steam-table conference. Skeleton **steam tables.** (1 000 words.)

Modern Transport. (London.)

1931 656. 23
Modern Transport, No. 627, 21 March, p. 3.
Conveyance of special railway traffic. (1 300 words & fig.)

1931 656 .23 (.42)
Modern Transport, No. 627, 21 March, p. 4.
Railway freight rebates. (1 200 words.)

1931 625 .258 (.42)
Modern Transport, No. 627, 21 March, p. 5.
Economy and simplicity in marshalling yard equipment. Outstanding features of the **eddy current rail brake.** (2 500 words & fig.)

1931 659 (.42)
Modern Transport, No. 627, 21 March, p. 7.
Art and the modern poster. Same examples from the London & North Eastern Railway exhibition. (Fig.)

1931 656 .25
Modern Transport, No. 627, 21 March, p. 8.
Responsibilities of the signal engineer. (3 000 words.)

1931 656 .255
Modern Transport, No. 628, 28 March, p. 3.
Token systems in railway signalling. (2 500 words & fig.)

1931 656 .2
Modern Transport, No. 628, 28 March, p. 3.
The railways and the traders. (2 200 words.)

1931 656 .253 (.42)
Modern Transport, No. 628, 28 March, p. 10.
Power signalling on the London & North Eastern Railway. (1 800 words & fig.)

1931 625 .23
Modern Transport, No. 628. 28 March, p. 11.
Non-telescoping railway carriages. (1 000 words & fig.)

1931 656 .1 (.42) & 656 .2 (.42)
Modern Transport, No. 628, 28 March, p. 21.
Taxation and the road transport industry. (2 300 words & fig.)

1931 625 .1 (.45)
Modern Transport, No. 629, 4 April, p. 3.
New railway through the Stelvio pass. (1 900 words & map.)

1931 621 .332
Modern Transport, No. 629, 4 April, p. 5.
Reinforced concrete in railway construction. (1 200 words.)

1931 656 .211 .7 (.42)
Modern Transport, No. 629, 4 April, p. 9.
Stranraer route to Northern Ireland. (1 000 words & fig.)

1931 656 .25
Modern Transport, No. 630, 11 April, p. 3.
Railway signalling apparatus. (1 800 words.)

1931 656 .211 .7 (.42)
Modern Transport, No. 630, 11 April, p. 6.
New steamship for Manx services. (1 700 words & fig.)

1931 621 .43
Modern Transport, No. 630, 11 April, p. 7.
Diesel engines for all forms of transport. (1 900 words & fig.)

1931 625 .4 (.42)
Modern Transport, No. 631, 18 April, p. 3.
New tube railway facilities to western suburbs. (2 500 words & fig.)

1931 656 (.42)
Modern Transport, No. 631, 18 April, p. 6.
Final report of the Royal Commission on Transport. (3 700 words.)

1931 385 .1 (.42)
Modern Transport, No. 631, 18 April, p. 8.
Future of the railways. **Simplification of charges and possible unification.** (1 800 words & fig.)

1931 385
Modern Transport, No. 632, 25 April, p. 2.
Economy on the railways. (800 words.)

1931 385 (09 (.460)
Modern Transport, No. 632, 25 April, p. 3.
The railways of Spain. Developments following the military dictatorship. (1 800 words.)

1931 656 .1 (.42)
Modern Transport, No. 632, 25 April, p. 4.
Proceedings before area commissioners. (Road Traffic Act). 2 300 words.)

1931 656 .25
Modern Transport, No. 632, 25 April, p. 5.
Economy in railway operation. Advantages of **speed signalling.** (2 000 words & fig.)

1931 725 .3

odern Transport, No. 632, 25 April, p. 8.

The **architecture of modern transport.** (1 600 words.)

1931 **656 (.94)**

odern Transport, No. 632, 25 April, p. 10.

Transport position in Australia. (1 600 words.)

1931 **621 .33 (.42)**

odern Transport, No. 633, 2 May, p. 3.

British railways to be completely **electrified.** (6 000 ords & table.)

1931 **621 .133 .5**

odern Transport, No. 633, 2 May, p. 9.

Locomotive efficiency. Importance of the **blast pipe.** 500 words.)

1931 **656 .211 (.460) & 725 .31 (.460)**

odern Transport, No. 634, 9 May, p. 3.

New **passenger station** at Barcelona. (800 words fig.)

1931 **388 (.436) & 621 .33 (.436)**

odern Transport, No. 634, 9 May, p. 5.

Electrification of Vienna city railway. (To be con- nued.) (2400 words & fig.)

1931 **656 .1 (.42)**

odern Transport, No. 634, 9 May, p. 7.

Proceedings before area Commissioners **Road traffic.** olicy of the **Railway** Companies. (2 500 words.)

1931 **656 .25 (.42)**

odern Transport, No. 635, 16 May, p. 3.

CHALLIS (W.). — Developments in **railway signal- ng.** (1 700 words & fig.)

1931 **621 .33 (.42)**

odern Transport, No. 635, 16 May, p. 7.

Electrification of Manchester, South Junction and ltrincham Railway. (5 000 words & fig.)

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roceedings, American Society of Civil Engineers. (New York.)

1931 624 .2

roceed., Amer. Soc. civil Eng., March, p. 469.

WITMER (F. P.). — **Analysis of continuous frames** y distributing **fixed-end moments.** (2 400 words & fig.)

1931 624 .2

roceed., Amer. Soc. civil Eng., March, p. 513.

RATHBUN (J. Ch.). — An analysis of **multiple- kew-arches** on **elastic piers.** (16 200 words, 4 tables fig.)

1931 624 .2

roceed., Amer. Soc. civil Eng., March, p. 623.

STRAUB (L. G.). — **Plastic flow in concrete arches.** 000 words.)

1931 **385 .2**

Proceed., Amer. Soc. civil Eng., March, p. 629.

ASHBURN (T. Q.), CORNISH (L. D.) & HADLEY (E. A.). — Relation between **rail and waterway trans- portation** : a symposium. (8 400 words, 1 table & fig.)

Railway Age. (New York.)

1931 **625 .1 (.73)**

Railway Age, No. 11, 14 March, p. 533.

Heavy construction on the Norfolk & Western. (3 500 words & fig.)

1931 **625 .232 (.73)**

Railway Age, No. 11, 14 March, p. 538.

Florida East Coast **redecorates dining car.** (1 200 words & fig.)

1931 **656 .1 & 656 .2**

Railway Age, No. 11, 14 March, p. 540.

Tax-aided **competition** denounced by bank leader. (2 300 words.)

1931 **385 .3 (.42) & 656 (.42)**

Railway Age, No. 11, 14 March, p. 543.

Report on transport in Britain. (1 700 words.)

1931 **656 .223 (.73)**

Railway Age, No. 11, 14 March, p. 545.

Efficiency increased by **operating changes.** (1 900 words & fig.)

1931 **385 .3 (.73) & 656 .1 (.73)**

Railway Age, No. 11, 14 March, p. 548.

Motor transport investigation. (4 000 words.)

1931 **656 .253 (.42)**

Railway Age, No. 11, 14 March, p. 552.

British report on **automatic train control.** (1 200 words.)

1931 **656 .26 (.73)**

Railway Age, No. 12, 21 March, p. 574.

New York City opens finest **dining car commissary** in the country. (1 000 words & fig.)

1931 **621 .33**

Railway Age, No. 12, 21 March, p. 577.

SIDNEY WITHINGTON. — Thirty-five years expe- rience with **heavy electric traction.** (2 100 words.)

1931 **656 .1 (.42) & 656 .2 (.42)**

Railway Age, No. 12, 21 March, p. 580.

Motor car for road and rail. (1 000 words & fig.)

1931 **656 .2 (06**

Railway Age, No. 12, 21 March, p. 582.

The modern **trend of transportation.** (3 000 words.)

1931 **625 .122 (.73)**

Railway Age, No. 12, 21 March, p. 585.

Cincinnati, New Orleans & Texas Pacific constructs **embankments** in three foot lifts. (1 [illegible] words & fig.)

1931 **621 .132 .5 (.944)**
Railway Age, No. 12, 21 March, p. 588.
New South Wales **Mountain type locomotives.** (700 words, figure and table.)

1931 **656 .23 (.73)**
Railway Age, No. 12, 21 March, p. 589.
Reciprocity on New York Central. (4 800 words.)

1931 **385 .3 (.73) & 656 .1 (.73)**
Railway Age, No. 12, 21 March, p. 593.
Motor transport hearings ended. Railroads urge regulation to stop discriminatory competition, or relief from restrictions. (6 800 words.)

1931 **621 .132 .3 (.71)**
Railway Age, No. 13, 28 March, p. 617.
Canadian Pacific Railway, **4-6-4 type locomotives** give good performance. (2 000 words, table & fig.)

1931 **656 .255 (.73)**
Railway Age, No. 13, 28 March, p. 620.
THOMAS (G. K.). — The Santa Fé installs **centralized traffic control** on 33.7 miles of line. (1 900 words & fig.)

1931 **656 .261 (.73)**
Railway Age, No. 13, 28 March, p. 631.
Missouri-Kansas-Texas **recovers lost freight traffic.** (1 500 words.)

1931 **656 .1 (.73) & 656 .211 .6 (.73)**
Railway Age, No. 13, 28 March, p. 633.
Pennsylvania makes progress in **train-bus coordination.** (1 500 words & fig.)

1931 **385 .1**
Railway Age, No. 14, 4 April, p. 665.
LISMAN (F. J.). — A **railroad umpire** would remedy many major ills. (4 900 words & fig.)

1931 **621 .132 .5 (.73)**
Railway Age, No. 14, 4 April, p. 669.
Lebigh Valley buys two **4-8-4 locomotives** (to haul 3 000-ton trains.) (1 100 words, table & fig.)

1931 **625 .122 (.73)**
Railway Age, No. 14, 4 April, p. 671.
Four-mile line requires three milion yards of fill. (4 000 words & fig.)

1931 **621 .33 (.73)**
Railway Age, No. 14, 4 April, p. 676.
MAYHAM (A. J.). — Twenty-four years' **operation** on the Spokane, Cœur D'Alene & Palouze. (3 000 words, tables & fig.)

1931 **621 .139 (.73), 625 .18 (.73) & 625 .27 (.73)**
Railway Age, No. 14, 4 April, p. 682.
New York Central obtains better results in **stores** work. (2 600 words & fig.)

1931 **625 .258 (.73)**
Railway Age, No. 15, 11 April, p. 706.
The Erie installs **retarders** in Marion yard. (1 500 words & fig.)

1931 **625 .27 (.73)**
Railway Age, No. 15, 11 April, p. 708.
Handling train supplies on the Southern Pacific (1 300 words & fig.)

1931 **621 .87 (.73)**
Railway Age, No. 15, 11 April, p. 710.
Double-end gas-electric wrecking **crane.** (600 words.)

1931 **625 .1 (.73)**
Railway Age, No. 15, 11 April, p. 711.
Missouri Pacific **completes important double track,** (4 400 words & fig.)

1931 **625 .245 (.73)**
Railway Age, No. 15, 11 April, p. 720.
New Santa Fe **horse express cars.** (1 700 words & fig.)

1931 **625 .122 (.73)**
Railway Age, No. 16, 18 April, p. 754.
Through 33 miles of rock. (1 700 words & fig.)

1931 **621 .134 .1 (.73)**
Railway Age, No. 16, 18 April, p. 759.
Ten wheel switcher with aluminium rods. (900 words, table & fig.)

1931 **385 .1 (.73)**
Railway Age, No. 16, 18 April, p. 761.
Pro and Con on need for umpire. (1 700 words.)

1931 **656 .212 .6 (.73)**
Railway Age, No. 16, 18 April, p. 764.
MILLER (J. V.). — **Expand lift truck and skid handling** on the Milwaukee. (1 300 words & fig.)

1931 **621 .132 .8 (.43)**
Railway Age, No. 16, 18 April, p. 771.
WAGNER (R. P.). — **Krupp-Zœlly turbine locomotive.** (2 000 words, table & fig.)

1931 **621 .338 (.73)**
Railway Age, No. 17, 25 April, p. 796.
WRIGHT (G. I.). — **Cars for the Reading suburban electrification.** (3 500 words & fig.)

1931 **625 .18 (.73)**
Railway Age, No. 17, 25 April, p. 801.
DUVALL (L. F.). — **Pruning and weeding stocks** aid Atlantic Coast Line supply work. (1 400 words & fig.)

1931 625 .144 .4 (.73)
Railway Age, No. 17, 25 April, p. 807.
RAY (George J.). — Present-day maintenance problems and the engineer. (4 000 words.)

1931 621 .133 .4 (.73)
Railway Age, No. 17, 25 April, p. 813.
Improved spark arrester developed on the Northern Pacific. (1 600 words & fig.)

1931 656 .1 (.73)
Railway Age, No. 17, 25 April, p. 818.
Illinois Central substitutes buses for trains. (1 200 words & fig.)

1931 656 .1 (.73) & 656 .261 (.73)
Railway Age, No. 17, 25 April, p. 820.
Citton Belt benefits from bus and truck service. (1 800 words & fig.)

1931 656 .253 (.73)
Railway Age, No. 18, 2 May, p. 856.
New York Central re-signals tracks entering Grand Central terminal. (1 900 words & fig.)

1931 621 .134 .3 (.42)
Railway Age, No. 18, 2 May, p. 859.
GRESLEY (H. N.). — British 4-6-4 high-pressure locomotive. (2 600 words, table & fig.)

1931 625 .245 (.73) & 656 .1 (.73)
Railway Age, No. 18, 2 May, p. 863.
Simplifying road-rail transfer. (900 words & fig.)

1931 625 .111 (.73)
Railway Age, No. 18, 2 May, p. 865.
Grade crossing elimination on the Long Island. (2 900 words & fig.)

1931 385 .113 (.42)
Railway Age, No. 18, 2 May, p. 872.
FRASER (W. H.). — British roads in 1930 depression. (3 500 words, tables & fig.)

Railway Engineer. (London.)

1931 625 .143 .2 & 625 .143 .3
Railway Engineer, April, p. 126.
A remedy for internal fissures in rails. (1 100 words.)

1931 625 .26 (.42)
Railway Engineer, April, p. 126.
Progressive carriage repairs. (1 400 words.)

1931 625 .26 (.42)
Railway Engineer, April, p. 129.
Reorganisation of Lancing railway carriage repair works, Southern Railway. (8 000 words & fig.)

1931 656 .253 (.42)
Railway Engineer, April, p. 144.
Re-signalling of the Uxbridge branch, Metropolitan Railway. (3 700 words & fig.)

1931 656 .215 (.42)
Railway Engineer, April, p. 150.
Improved paraffin vapour burning lamps. (1 000 & fig.)

1931 621 .132 .3 (.42)
Railway Engineer, April, p. 152.
New three-cylinder 2-6-0 type locomotives, Southern Railway. (500 words & fig.)

1931 625 .143 .2 & 625 .143 .3
Railway Engineer, April, p. 153.
ALLEN (C. J.). — The modern application of the Sandberg sorbitic rail treatment. — II. (3 600 words & fig.)

1931 625 .144 .2
Railway Engineer, April, p. 157.
A railway maintenance problem. (500 words & fig.)

1931 625 .215
Railway Engineer, April, p. 159.
HENDERSON (P. L.). — The riding qualities of railway coaches. (7 500 words & fig.)

Railway Engineering and Maintenance. (Chicago.)

1931 625 .174 (.73)
Railway Engineering and Maintenance, April, p. 354.
Snow-melting equipment saves the day. (4 500 words & fig.)

1931 625 .143 (.73)
Railway Engineering and Maintenance, April, p. 358.
Eric Railway adopts special track details. (3 900 words & fig.)

1931 621 .133 .7 (.73) & 725 .33 (.73)
Railway Engineering and Maintenance, April, p. 362.
ZAHM (R. V.). — The Missouri-Kansas & Texas treats water twice in new plant. (2 800 words & fig.)

1931 625 .15 (.73) & 665 .882 (.73)
Railway Engineering and Maintenance, April, p. 364.
WISE (Ch.). — Out-of-track welding saves in big yard. (3 600 words & fig.)

1931 625 .122 (.73)
Railway Engineering and Maintenance, April, p. 367.
Lackawanna cures soft spots by simple methods. (3 000 words & fig.)

1931 625 .75
Railway Engineering and Maintenance, April, p. 370.
KNOWLES (C. R.). — Organizing for repair (track motor cars). (6 500 words & fig.)

1931 624
Railway Engineering and Maintenance, April, p. 375.
HAGGANDER (G. A.). — Modernizing timber trestle practices. (3 700 words & fig.)

1931 621 .133 .7 (.73) & 725 .33 (.73)
Railway Engineering and Maintenance, May, p. 454.
CULLEN (E. J.). — Lehigh Valley Railroad modernizes water facilities. (4 400 words & fig.)

1931 625 .123
Railway Engineering and Maintenance, May, p. 457.
Stabilizing soft track. (4 000 words & fig.)

1931 625 .11 (.73)
Railway Engineering and Maintenance, May, p. 460.
LANG (P. G.). — Working in close quarters. (2 500 words & fig.)

1931 625 .144 .4
Railway Engineering and Maintenance, May, p. 462.
WILLAHAN (A. E.). — Eliminating the hazard in power equipment. (3 000 words & fig.)

1931 625 .13
Railway Engineering and Maintenance, May, p. 464.
Jack 68-in. pipe under fill. (2 300 words & fig.)

1931 625 .172 (.73)
Railway Engineering and Maintenance, May, p. 466.
CLEVELAND (W. H.). — Putting permanency into weed killing. (4 100 words & fig.)

Railway Gazette. (London.)

1931 625 .22 (.68)
Railway Gazette, No. 12, 20 March, p. 449.
Loading gauges, South African Railways. (150 words & fig.)

1931 347 .763 (.42) & 388 (.42)
Railway Gazette, No. 12, 20 March, p. 450.
London passenger transport bill. (2 300 words.)

1931 656 .253 (.42)
Railway Gazette, No. 12, 20 March, p. 452.
Re-signalling of the UXbridge branch, Metropolitan Railway. (2 400 words & fig.)

1931 625 .258 (.42) & 656 .254 (.42)
Railway Gazette, No. 12, 20 March, p. 457.
Rail brakes and centralised traffic control. (1 300 words & fig.)

1931 621 .135 .2 & 625 .212
Railway Gazette, No. 12, 20 March, p. 467.
Rubber-cushioned wheels for railway locomotives and carriages. (300 words & fig.)

1931 656 .1
Railway Gazette, No. 13, 27 March, p. 482.
CROOK (F. C.). — The railways and road transport. (1 600 words.)

1931 625 .175
Railway Gazette, No. 13, 27 March, p. 484.
New Drewry petrol-driven rail inspection car. (1 200 words & fig.)

1931 621 .335
Railway Gazette, No. 13, 27 March, p. 485.
A new electric battery locomotive. (850 words & fig.)

1931 656 .23 (.42)
Railway Gazette, No. 13, 27 March, p. 487.
Railway prospects. (1 900 words.)

1931 656 .222 .1 (.73)
Railway Gazette, No. 14, 3 April, p. 513.
Locomotive performance in America. (1 600 words & table.)

1931 656 .211 .7 (.489)
Railway Gazette, No. 14, 3 April, p. 515.
The train ferries of Denmark. (2 100 words & fig.)

1931 625 .245 (.54)
Railway Gazette, No. 14, 3 April, p. 519.
New 50-ton hopper wagons for India. (500 words & fig.)

1931 625 .245 (.68)
Railway Gazette, No. 14, 3 April, p. 521.
Dynamometer car, South African Railways. (1 500 words & fig.)

1931 621 .137 (.82)
Railway Gazette, No. 14, 3 April, p. 524.
Extended locomotive runs on the Central Argentine Railway. (1 300 words & fig.)

1931 656 .223 .2 (.42)
Railway Gazette, No. 14, 3 April, p. 528.
Peculiarities of British freight train operation. (1 300 words.)

1931 656 .211 .7 (.42)
Railway Gazette, No. 15, 10 April, p. 547.
Southern Railway motor-car ferry « autocarrier ». (1 400 words & fig.)

1931 656 .211 .7 (.42)
Railway Gazette, No. 15, 10 April, p. 549.
New steamer for Stranraer-Larne service, London Midland & Scottish Railway. (2 400 words & fig.)

1931 621 .87 (.42)
Railway Gazette, No. 15, 10 April, p. 551.
A railway breakdown crane of 105 tons capacity. (3 000 words & fig.)

1931 621 .132 .8 (.43) & 621 .43 (.43)
Railway Gazette, No. 15, 10 April, p. 553.
Diesel compressed-air locomotive, German Railways. (700 words.)

1931 529
Railway Gazette, No. 16, 17 April, p. 580.
Railway companies and the reform of the calendar. (1 800 words & fig.)

1931 385 .11 (.42)
ilway Gazette, No. 16, 17 April, p. 585.
Financial results of the group railway companies in 30. An analysis of the accounts and statistics as own in the published reports for the past year. (5 300 rds & tables.)

1931 624 .8 (.494)
ilway Gazette, No. 16. 17 April, p. 617.
A removable railway bridge. (1 300 words & fig.)

1931 656 .225 (.42) & 656 .261 (.42)
ilway Gazette, No 16, 17 April, p. 618.
New road container service, Southern Railway. (500 rds & fig.)

1931 621 .33 (.42)
ilway Gazette, No. 17, 24 April, p. 632.
The Weir Committee on electrification. The Weir re- rt. (2 500 words.)

1931 656 .25 (0
ilway Gazette, No. 17, 24 April, p. 632.
The old order (in signalling) changeth. (1 300 words.)

1931 385 .1 (.460)
ilway Gazette, No. 17, 24 April, p. 636.
The railway problem in Spain. (2 800 words.)

1931 621 .9 (.42)
ilway Gazette, No. 17, 24 April, p. 637.
A handy steam pipe jig. (500 words & figure.)

1931 656 .211 .7 (.44)
ilway Gazette, No. 17, 24 April, p. 638.
The new cross-channel steamer « Côte d'Azur ». 700 words & fig.)

1931 621 .137 .1 (.73)
ilway Gazette, No. 17, 24 April, p. 640.
Mechanical stoking on locomotives. (1 100 words & .)

1931 621 .33 (.42)
ilway Gazette, No. 18, 1 May, p. 664.
The Weir electrification report. — Some comments the report. (2 500 words.)

1931 621 .33 (.42)
ilway Gazette, No. 18, 1 May, p. 669.
Abstract of the Weir report on main-line electrifica- n. (10 000 words.)

1931 064 (.82)
ilway Gazette, No. 18, 1 May, p. 675.
The British Empire trade exhibition, Buenos Aires. 500 words & fig.)

1931 621 .138 .2 (.44)
ilway Gazette, No. 18, 1 May, p. 680.
New locomotive coaling plant at Nevers, Paris-Lyons- diterranean Railway. (1 300 words & fig.)

1931 621 .133 (.42)
ilway Gazette, No. 19, 8 May, p. 696.
Railway electrification. (1 400 words.)

1931 621 .133 (.42)
Railway Gazette, No. 19, 8 May, p. 701.
Manchester, South Junction & Altrincham electrification. (2 500 words & fig.)

1931 621 .132 .5 (.44)
Railway Gazette, No. 19, 8 May, p. 705.
Rebuilt « Pacific » locomotive, Paris-Orleans Railway. (1 500 words & fig.)

1931 656 .1 (.42)
Railway Gazette, No. 19, 8 May, p. 709.
Devon General Omnibus & Touring Co. Ltd. (3 000 words & fig.)

1931 621 .134 .4
Railway Gazette, No. 20, 15 May, p. 728.
Has compounding failed ? (1 300 words.)

1931 621 .33 (.42)
Railway Gazette, No. 20, 15 May, p. 728.
Alternatives to main-line electrification. (1 400 words.)

1931 621 .33 (.42)
Railway Gazette, No. 20, 15 May, p. 733.
Weir committee electrification report, appendix IV. (6 200 words, tables & figure.)

1931 385. (09 (.81)
Railway Gazette, No. 20, 15 May, p. 740.
The São Paulo-Paraná Railway. (1 000 words & fig.)

1931 725 .35 (.45)
Railway Gazette, No. 20, 15 May, p. 745.
Cold-storage warehouse at Verona, Italy. (1 700 words & fig.)

Railway Magazine. (London.)

1931 656 .222 .1 (.42)
Railway Magazine. April, p. 275.
ALLEN (C. J.). — British locomotive practice and performance. (5 200 words & fig.)

1931 656 .222 .1 (.42)
Railway Magazine, May, p. 347.
ALLEN (C. J.). — British locomotive practice and performance. (9 600 words & fig.)

Railway Mechanical Engineer. (New York.)

1931 62. (01 & 625 .214
Railway Mechanical Engineer, March, p. 113.
A test plant to study journal operation. (2 100 words & fig.)

1931 621 .137 .1
Railway Mechanical Engineer, March, p. 116.
ROOSEN (R.). — Stug system of firing pulverized fuel. I. — (3 500 words, 2 tables & fig.)

1931 **669**
Railway Mechanical Engineer, March, p. 121.
SCOTT (W. S.). — **Industrial electric heating for railway shops. II.** — (3 200 words & fig.)

1931 **621 .132 .3 (.73)**
Railway Mechanical Engineer, March, p. 124.
New Jersey Central 4-6-2 type locomotive. (2 800 words & fig.)

1931 **625 .216 (.73)**
Railway Mechanical Engineer, March, p. 126.
Baltimore & Ohio tests coupler equipment. (2 000 words & fig.)

1931 **625 .26 (.73)**
Railway Mechanical Engineer, March, p. 129.
Maintaining Burlington motor rail cars. (5 600 words & fig.)

1931 **621 .132 .3 (.71)**
Railway Mechanical Engineer, March, p. 167.
4-6-4 type locomotives on the Canadian Pacific. (3 500 words & fig.)

1931 **621 .135 .4**
Railway Mechanical Engineer, March, p. 172.
HALL (R. F.). — **Layouts of locomotives on curves.** (1 700 words & fig.)

1931 **62. (01**
Railway Mechanical Engineer, April, p. 174.
ISENBURGER (H. R.). — **Radiography** applied to **railway materials.** (3 500 words & fig.)

1931 **625 .26 (.73)**
Railway Mechanical Engineer, April, p. 178.
Handling **coach repairs** on the Florida East Coast. (3 500 words & fig.)

1931 **621 .132 .5 (.43) & 621 .137 .1 (.43)**
Railway Mechanical Engineer, April, p. 182.
ROOSEN (R.). — Stug system of firing **pulverised fuel. II.** — (3 500 words & fig.)

1931 **625 .26 (.73)**
Railway Mechanical Engineer, April. p. 186.
BARTHELEMY (P. P.). — Condensed mechanical **data for car department** reference. (2 800 words & fig.)

1931 **625 .248 (.73)**
Railway Mechanical Engineer, April, p. 196.
Cleaning cars with live steam. (700 words & fig.)

Railway Signaling. (Chicago.)

1931 **656 .253 (.73)**
Railway Signaling, April, p. 111.
KELLOWAY (C. J.). — A. P. B. **search-light signals** on the Atlantic Coast Line. (2 800 words & fig.)

1931 **625 .258 (.73) & 656 .259 (.73)**
Railway Signaling, April, p. 115.
The Erie installs **retarders** in Marion yard. (2 100 words & fig.)

1931 **656 .255 (.7**
Railway Signaling, April, p. 118.
THOMAS (G. K.). — **Centralized traffic control** o the Santa Fe. (3 500 words & fig.)

1931 **625 .162 (.73) & 656 .259 (.7**
Railway Signaling, April, p. 123.
TYLER (R. F.). — Unique **highway crossing prote tion** in Seattle. (600 words & fig.)

1931 **625 .162 (.73) & 656 .259 (.7**
Railway Signaling, April, p. 124.
Report of American Railway Engineering Associatio on **crossing signals.** (1 900 words & fig.)

1931 **656 .258 (.7**
Railway Signaling, April, p. 127.
POST (E. K.). — Pennsylvania cuts over lar **interlocking plant** without delaying traffic. (2 1(words & fig.)

1931 **625 .162 & 656 .2**
Railway Signaling, April, p. 130.
HASTE (M.). — Argentine **crossing signals.** (60 words & fig.)

In Spanish.

Gaceta de los Caminos de hierro. (Madrid.)

1931 **621 .132 .8 (.43**
Gaceta de los Caminos de hierro, nº 3650, 10 de marz p. 88.
Locomotora de turbina de 2 000 HP. Krupp-Zœll (1 700 palabras.)

Ingenieria y Construcción (Madrid).

1931 **621 .335 (.73**
Ingenieria y Construcción, febrero, p. 86.
MARDIS (P. L.). — La evolución de los **automotore** en Norteamérica durante 1930. (3 000 palabras & fig.

1931 **621 .39**
Ingenieria y Construcción, marzo, p. 144.
Cálculo de uniones por **soldadura eléctrica.** (7 200 pa labras & fig.)

1931 **624 .63 (.460**
Ingenieria y Construcción, abril, p. 201.
Los **viaductos y puentes de hormigón armado** para e ferrocarril de Alicante a Alcoy. (1 800 palabras & fig.

Revista de Obras Publicas. (Madrid.)

1931 **624 (.460**
Revista de Obras Publicas, nº 6, 15 de marzo, p. 103.
PRIETO (L.). — **Los nuevos puentes de fábrica** de l Compañia del Norte, linea de Palencia a La Coruñ (4 600 palabras & fig.)

931 721 .1
ista de Obras Publicas, nº 9, 1º de mayo, p. 175.
OYOS (J. M.). — La construcción de **muelles** sobre enos poco resistentes. (4 800 palabras & fig.)

931 656 .254
ista de Obras Publicas nº 9, 1º de mayo, p. 181.
UÑON (J. G.). — **Pasos a nivel.** (1 800 palabras.)

In Italian.

Annali dei lavori pubblici. (Roma.)

931 721 .4 (01
ali dei lavori pubblicci, febbraio, p. 126.
ELLUZZI (O.). — Il calcolo del **complesso elastico** ola — anello d'imposta — parete cilindrica. (7 700 ole & fig.)

931 62. (01
ali dei lavori pubblici, febbraio, p. 145.
RALL (G.). — Entita effettiva e limitazioni supei degli **sforzi di temperatura nei sistemi elastici.** oo parole & fig.)

L'Ingegnere. (Roma.)

931 621 .87 (.61)
Ingegnere, Febbraio, p. 93.
OTTARLINI (R.). — **Impianti di sollevamento e di porto** per i lavori del porto di Bengasi. (2 300 pa- & fig.)

Notiziario tecnico. (Firenze.)

931 621 .131 .3
iziario tecnico, marzo, p. 65.
iteri moderni per le esperienze dinamometriche con **motive a vapore.** (1 900 parole & fig.)

931 621 .132 .8
iziario tecnico, aprile, p. 100.
elica e la ferrovia veloce. (1 800 parole & fig.)

931 621 .9 (.45) & 621 .138 .5 (.45)
iziario tecnico, maggio, p. 2.
ettificatrice a due teste per parasale in **opera dei i di locomotive, di carrelli,** ecc. (1 800 parole & fig.)

ista delle Comunicazioni ferroviarie. (Roma.)

931 656 .225 (.45)
delle Commic. ferrov., nº 9, 1º Maggio, p. 15.
TTARAPPA (C.). — **Nuovi servizi** nelle Ferrovie Stato. (1 300 parole.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1931 385. (072 (.45)
Rivista tecnica delle ferrovie italiane, 15 febbraio, p. 49; 15 marzo, p. 137; 15 avril, p. 170.
FORTE (G.). — **La recente riforma nella Sezione Ferroviaria del R. Istituto Sperimentale delle Comunicazioni.** (Continua.) (6 900 parole & fig.)

1931 621 .33
Rivista tecnica delle ferrovie italiane, 15 febbraio, p. 64.
PONTECORVO (L.). — Sistema autocompensato di linea di contatto a catenarie incrociate nella **elettrificazione** delle ferrovie basche. (7 300 parole & fig.)

1931 621 .332 (.45)
Rivista tecnica delle ferrovie italiane, 15 marzo, p. 7.
MAZZONI (A.). — La **conduttura elettrica** alta tensione Morbegno-Voghera. (19 000 parole & fig.)

1931 621 .333
Rivista tecnica delle ferrovie italiane, 15 marzo, p. 11.
BIANCHI (G.). — I **motori elettrici** di trazione. (5 600 parole.)

1931 621 .131 .1 (.45)
Rivista tecnica delle ferrovie italiane, 15 marzo, p. 179.
DIEGOLI (M.). — **Locomotive con freno a repressione d'aria** nelle prove dinamometriche. (5 700 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 656 .224 (.492)
De Ingenieur, nº 13, 27 Maart, p. 31.
PATER (J. G.). — De **organisatie van het staatsbedrijf der Posterijen, Telegrafie en Telefonie** en haar aanpassing aan de verkeersbehoeften. (9 000 woorden & fig.)

1931 624
De Ingenieur, nº 16, 17 April, p. 117.
ROGGEVEEN (A.). — Breuk in **slanke getrokken staven.** (2 400 woorden & fig.)

De Locomotief. (Amsterdam.)

1931 625 .62 (.43)
De Locomotief, nº 5, 1 Maart, p. 33.
Tramlijnaankondigers. (800 woorden.)

1931 625 .213
De Locomotief, nº 5, 16 Maart, p. 41.
Een nieuw **veerbladprofiel.** (2 300 woorden & fig.)

1931 625 .62 (.43)
De Locomotief, nº 7, 1 April, p. 49.
Nieuwe **volgwagens** bij de tram te Saarbrücken. (2 800 woorden & fig.)

1931 625 .62
De Locomotief, nº 8, 16 April, p. 57.
Nota **richtingaanwijzing** bij tramwegen. (3 500 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1931 **621 .132 .8 & 621 .43**

Spoor- en Tramwegen, nº 5, 3 Maart, p. 113; nº 6, 17 Maart, p. 149.

CORPORAAL (H. E.). — **Spoorwegdieselmotoren van Frichs.** (4 800 woorden & fig.)

1931 **625 .251**

Spoor- en Tramwegen, nº 5, 3 Maart, p. 116.

KATER (J.). — **Remproblemen.** (4 200 woorden & fig.)

1931 **621 .131 .1**

Spoor- en Tramwegen, nº 8, 14 April, p. 193; nº 9, 28 April, p. 224.

GOEKOOP (A.). — De **zandvoorziening der locomotieven.** (3 500 woorden & fig.)

1931 **385 (.51)**

Spoor- en Tramwegen, nº 8, 14 April, p. 205.

WEYER (J.). — De **Chineesche Oosterspoorweg.** (1 800 woorden & fig.)

1931 **621 .331 (.92) & 621 .332 (.92)**

Spoor- en Tramwegen, nº 9, 28 April, p. 219; nº 10, 12 Mei, p. 250.

FRONCZEK (H. H.). — De **electriciteitsvoorziening van stations, werkplaatsen en rangeeremplacementen der Staatsspoorwegen in- en om Batavia.** (2 200 woorden, 1 tabel & fig.)

In Polish.

INŻYNIER KOLEJOWY. (Warszawa.)

1931 **656 .211 (.438)**

Inzynier Kolejowy, 1 Marca, str. 73.

WOLKANOWSKI (J.). — **Projekt Dworca Glownego w Warszawie.** (3 600 slowa & rys.)

1931 **385 .5**

Inzynier Kolejowy, 1 Kwietnia, str. 113.

RYBICKI (F.). — **Zastosowanie psychologji w kolejowej stuzbie ruchu.** (4 800 slowa.)

In Portuguese.

Boletim do Instituto de Engenharia (S. Paulo) (Brasil.)

1931 **62. (0**

Boletim do Instituto de Engenharia, Janeiro, p. 23.

SANTOS REIS (Felippe dos). — Os nossos ultimos resultados sobre as derivadas do **trabalho de deformação, obtidos de um dos theoremas recentemente descobertos.** (1 000 palavras & fig.)

Gazeta dos Caminhos de ferro. (Lisboa.)

1931 **385. (09 (.469**

Gazeta dos Caminhos de ferro, 1 de maio, p. 180.

TORRES (C. M.). — **O caminho de ferro em Portugal.** (Continua.) (1 800 palavras.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1931 **621 .33 (.72**

Revista das Estradas de ferro, 15 de abril, p. 147.

A electrificacão da estrada « Ferro-Carril Mexicano » (Continua.) (800 palavras & fig.)

11.005. — Publisher : M. Weissenbruch Co., Ltd., Printer to the King, 49, rue du Poinçon, Brussels.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

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I. — BOOKS.

In French.

1931 621 .132 (.44) & 625 .232 (.44)

Compagnie des Chemins de fer Paris-Lyon-Méditerra-ée. Exposition Coloniale Internationale, Paris 1931.

Paris. Edité par la Compagnie P. L. M. 7 notices.

1931 69 (02

IASSOTTE (E.).

Carnet des travaux publics et du bâtiment.

Paris (6e), Ch. Béranger, 15, rue des Saints-Pères & Liége, 1, quai de la Grande-Bretagne. Un volume 12 × 21), 507 pages, 380 figures et 78 tableaux. Prix : 105 francs.)

1931 624

ILPOUL (Jacques), ingénieur A.-M.

L'esthétique des ponts.

Paris, numéro spécial (février 1931) du **Moniteur des Travaux publics de l'entreprise et de l'industrie**, 23, rue e Châteaudun. Une brochure de VI + 110 pages, avec e nombreuses illustrations. (Prix : 25 fr. français; tranger : 30 fr. français.)

1931 691. (06 & 721 .9 (06

Rapports présentés au premier Congrès international u béton et du béton armé tenu à Liége en septembre 930.

Paris (9e), Editions de la Technique des travaux, 54, ue de Clichy & Liége, 196, rue Grétry. Deux volumes 25 × 32), 1 000 pages, figures et planches. Prix : 50 fr. français ou 70 belgas.)

In German.

1931 691

RAF (O).

Versuche über die Wasserdurchlässigkeit von Zement-örtel und Beton, insbesondere über den Einfluss der Körnung des Sandes, der Kiesmenge usf. Wasser-aufn. und Wasserabgabe von Zementmörtel und Beton. Versuche mit gespritzten Mörteln.

Leipzig, Johann Ambrosius Barth; Brüssel, Falk, Fils, rue des Paroissiens, 22. 1 Band, 48 Seiten, mit 39 Textabbildungen und 16 Zsstellgn. (Preis : 7.20 R. M.)

1931 31

KOHLWEILER (E.).

Statistik im Dienste der Technik.

München und Berlin, R. Oldenbourg. 1 Band, 441 Seiten mit 82 Abbildungen. (Preis : 22 R. M.)

1931 62. (01

LEHR.

Schwingungstechnik.

Berlin, Springer. 1 Band, 295 Seiten u. 187 Textab-bildungen. (Preis : 24 R. M.)

1931 625 .143. (0

WATTMANN (J.).

Langschienen und Längskräfte im Eisenbahngleis.

Leipzig, Johann Ambrosius Barth; Brüssel, Falk, Fils, rue des Paroissiens, 22. 1 Band, 78 Seiten mit Abbildungen. (Preis : 6 R. M.)

In English.

1931 624 .3

RICARDO (H. R.).

The high-speed internal-combustion engine.

London, Blackie and Son, Limited. 1 volume, 430 pages. (Price : 30 sh. net.)

1931 693 (.42)

SCOTT (E. A.).

Arrol's reinforced concrete reference book.

London, E. F. and N. Spon, Limited. (Price : 16 sh. net.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress th the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway ... Weissenbruch in the number for November, 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1930 62 (06 (.94)

THE INSTITUTION OF ENGINEERS, AUSTRALIA.

Selected Papers from the Journal of the Institution. Volume I, 1930.

Sydney. Edited by the Secretary of the Institution, Science House, 157-161, Gloucester Street. 1 vol. (11 1/2 × 10 inches) of 286 pages with numerous illustrations.

1931 385. (08 (.73)

KANSAS CITY SOUTHERN RAILWAY COMPANY.

31 st annual report. Year ending 31 December 1930.

Kansas City, Missouri, U. S. A. 1 pamphlet of 43 pages with map.

1931 621 .43 (02

ADAMS (O.)

Modern Diesel engine practice.

New York, Norman W. Henley Publishing Co. 1 volume (6 × 10 inches), 656 pages & illustrations. (Price : $ 6.)

1931 536

MOSS (H.)

The revised heat drop tables.

London, W. 1, Edward Arnold and C°, 41, Maddox Street. 1 volume. (Price : 12 sh. 6 d.)

1931 621 .13 (06 (.73)

Proceedings of the Traveling Engineers Association.

Cleveland, Ohio, Thompson, W. O. 1 volume, 460 pages.

1931 62. (01 (06 (.73)

AMERICAN SOCIETY FOR TESTING MATERIALS.

Standards.

Philadelphia, published by the Society. Part I, Metals, 1 000 pages; Part II, Non-metals, 1 214 pages. (Price : Part I, $ 7.50; Part II, $ 7.50; both volumes, $ 14.)

In Italian.

1931 62. (06 (.45)

Relazioni tecniche al II Congresso nazionale degli ingegneri italiani.

Roma, Sindacato Nazionale Fascista Ingegneri, Via Vittorio, 7. 1 volume (23 × 32), 550 pagine e un supplemento (24 × 30). (Prezzo dei due volumi : 30 L.)

1931 69. (02

MASI (F.).

La pratica delle costruzioni metalliche: Tettoie, ponti, gru, torri, paratoie.

Milano, U. Hœpli. 1 volume, 530 pagine con 433 figure, tavole nel testo e 15 grandi tavole costruttive. (Prezzo : 80 L.)

[016 .385. (05]

II. — PERIODICALS.

In French.

Annales des Mines. (Paris.)

1931 624 .2

Annales des Mines, février, p. 249.

ROY (M.). — **Sur la torsion des poutres prismatiques à section rectangulaire.** (8 000 mots & fig.)

1931 621 .118

Annales des Mines, février, p. 274.

Bulletin des accidents d'appareils à vapeur survenus pendant l'année 1929. (Tableaux & fig.)

Annales des Ponts et Chaussées (Paris).

1931 62. (01

Annales des ponts et chaussées, mars-avril, p. 43.

PIGEAUD. — **La résistance des matériaux et l'élasticité au cours du dernier siècle.** (12 000 mots.)

1931 691

Annales des ponts et chaussées, mars-avril, p. 89.

FERET (R.). — **Liants hydrauliques, mortiers et bétons.** (7 600 mots.)

1931 385. (09 (.44)

Annales des ponts et chaussées, mars-avril, p. 141.

COLSON (C.). — **Les voies ferrées.** (10 000 mots.)

1931 721 .4

Annales des ponts et chaussées, mars-avril, p. 289.

SEJOURNE. — Comment, aujourd'hui, on projette et on construit les **grandes voûtes** en maçonnerie. (6 000 mots & fig.)

1931 624 .32 (09 & 624 .5 (09

Annales des ponts et chaussées, mars-avril, p. 311.

PIGEAUD. — **Les ponts métalliques** au cours du dernier siècle. (8 000 mots & fig.)

1931 691 & 624 .63

Annales des ponts et chaussées, mars-avril, p. 335.

CAQUOT. — **Le béton armé** et ses applications. (4 200 mots & fig.)

Arts et Métiers. (Paris.)

1931 **721 .9**

rts et Métiers, mai, p. 153.

FORESTIER (V.). — **Calcul du béton armé.** 400 mots & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1931 **621 .33 (.44)**

ull. de la Société d'encouragement pour l'industrie nationale, mars, p. 141.

GASQUET (R.). — L'état actuel de la **traction élec-ique** par accumulateurs en France. (4 800 mots & fig.)

1931 **621 .132.3 (.44)**

ull. de la Société d'encouragement pour l'industrie nationale, mars, p. 183.

SAUVAGE (E.). — **Locomotives à grande vitesse à atre essieux couplés** de la Compagnie des Chemins fer de l'Est. (1 900 mots.)

Bulletin de l'Association internationale permanente des Congrès de la route. (Paris.)

1931 **62. (01 & 691**

ull. de l'Association internationale permanente des Congrès de la route, mars-avril, p. 61.

VANDONE (I.). — Une nouvelle méthode pour la dé-rmination de la **résistance du béton au frottement** du ulement. (1 200 mots & fig.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1931 **313 .385 (.494)**

ull. des transp. intern. par ch. de fer, mai, p. 315.

Statistique des chemins de fer suisses pour l'exercice 929. (1 600 mots.)

---

ulletin technique de la Suisse romande. (Vevey.)

1931 **624 .2**

ull. techn. de la Suisse romande, n° 12, 13 juin, p. 149.

PARIS (A.). — **Moments fléchissants de la dalle sim-e** et largeur solidaire d'une charge concentrée. (1 800 ots & fig.)

1931 **625 .1 (.494)**

ull. techn. de la Suisse romande, n° 12, 13 juin, p. 151.

La **déviation de la ligne** Lausanne-Neuchâtel, entre pendes et Yverdon. (1 500 mots & fig.)

Chronique des transports. (Paris.)

1931 **381 .113 (.44)**

hronique des transports, n° 9, 10 mai, p. 9.

Les **résultats de l'exploitation** de la Compagnie des hemins de fer de l'Est en 1930. (3 000 mots.)

1931 **385 .1 (.44)**

Chronique des transports, n° 10, 25 mai, p. 2.

Déficit et prix de revient des chemins de fer. (1 700 mots.)

1931 **385 .113 (.44)**

Chronique des transports, n° 10, 25 mai, p. 6.

Les **résultats de l'exploitation** de la Compagnie des Chemins de fer du Midi en 1930. (6 000 mots.)

1931 **385 .113 (.44)**

Chronique des transports, n° 11, 10 juin, p. 11.

Les **résultats de l'exploitation** de la Compagnie du chemin de fer de Paris à Lyon et à la Méditerranée. (3 600 mots.)

Génie civil. (Paris.)

1931 **669**

Génie civil, n° 2544, 16 mai, p. 489.

GUILLET (L.). — L'état actuel de la **nitruration des produits métallurgiques.** (8 300 mots, 5 tables & fig.)

1931 **721 .9**

Génie civil, n° 2544, 16 mai, p. 503.

Constructions en béton armé sans boisage. (800 mots.)

1931 **62. (01 & 721 .9**

Génie civil, n° 2545, 23 mai, p. 522.

DEGUILLAUME (R.). — Monogramme compensateur à double alignement pour le **calcul des poutres** en **béton armé,** à section constante, comportant une table de compression. (3 000 mots & fig.)

1931 **669 .1**

Génie civil, n° 2546, 30 mai, p. 552.

Les **traitements thermiques des aciers** et les services rendus par le laboratoire à l'atelier. (1 800 mots & fig.)

1931 **621 .112 & 621 .134 .3**

Génie civil, n° 2547, 6 juin, p. 568; n° 2548, 13 juin, p. 589.

ENGLERT (F.). — **La chaudière Löffler** dans les installations fixes, les installations marines et les chemins de fer. (8 600 mots, 2 tableaux & fig.)

1931 **625 .4 (.431)**

Génie civil, n° 2547, 6 juin, p. 576.

L'état actuel du **réseau métropolitain** souterrain de Berlin. (400 mots & fig.)

1931 **721 .9**

Génie civil, n° 2548, 13 juin, p. 589.

BERCHON (E.). — Abaque pour le **calcul rapide des pieux en béton armé.** (1 000 mots & fig.).

La Traction électrique. (Paris.)

1931 **621 .33 (.494) & 621 .335 (.494)**

La Traction électrique, février, p. 33.

L'électrification des chemins de fer fédéraux suisses. (10 000 mots & fig.)

1931 621 .33 (.460)
La Traction électrique, février, p. 51; mars, p. 63; avril, p. 103.
L'électrification de la rampe de Pajares des Chemins de fer du Nord de l'Espagne. (19 000 mots & fig.) (A suivre.)

1931 621 .335 (.436)
La Traction électrique, mars, p. 63.
POKORNÝ (J.). — **Les locomotives électriques d'express** type 1A-B_0-A1, série E 466.0, à commande individuelle des essieux des Chemins de fer de l'Etat tchécoslovaque. (5 000 mots & fig.)

1931 621 .337
La Traction électrique, avril, p. 107.
HUG (A. M.). — **La commande individuelle des essieux** des systèmes utilisés pour locomotives et motrices dans l'exploitation des voies ferrées de toute nature. (5 000 mots & fig.) (A suivre.)

Les Chemins de fer et les Tramways. (Paris.)

1931 621 .132 .3 (.43)
Les chemins de fer et les tramways, mai, p. 83.
Nouvelles locomotives des Chemins de fer de l'Etat allemand. (2 700 mots & fig.)

1931 621 .132 .3 (.493)
Les chemins de fer et les tramways, mai, p. 85.
Essais des locomotives express type Mikado 1-4-1 des Chemins de fer de l'Etat belge. (600 mots & fig.)

1931 621 .132 .3
Les chemins de fer et les tramways, mai, p. 86.
Locomotives Pacific 2-3-1. (1 800 mots & fig.)

1931 621 .335
Les chemins de fer et les tramways, mai, p. 88.
SPIESS (E.). — **Locomotives électriques à marchandises** pour lignes interurbaines. (7 200 mots, 1 table & fig.)

1931 625 .23
Les chemins de fer et les tramways, mai, p. 93.
DUQUESNOY. — **Les machines à laver les voitures.** (1 800 mots & fig.)

1931 621 .133 .1
Les chemins de fer et les tramways, mai, p. 98.
Perfectionnements aux chargeurs pour locomotives. (2 300 mots & fig.)

1931 625 .235
Les chemins de fer et les tramways, mai, p. 101.
Serrure perfectionnée pour portières de wagons. (900 mots & fig.)

1931 625 .258
Les chemins de fer et les tramways, mai, p. 102.
Perfectionnements aux **sabots-freins.** (700 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1931 621 .33[illegible]
L'Ind. voies ferrées et transp. autom., avril, p. 120.
RICCIA (D.). — Procédé rationnel pour l'étude complète des caractéristiques du **moteur de traction à courant continu** et quelques remarques d'actualité. (7 000 mots & fig.) (A suivre.)

1931 625 .6 (09 (.493)
L'Ind. voies ferrées et transports autom., avril, p. 131.
BORDAS (F.). — La **Société Nationale belge des chemins de fer vicinaux.** (6 000 mots.)

Revue générale des chemins de fer. (Paris.)

1931 656 .211 (.44)
Revue générale des chemins de fer, juin, p. 577.
LEVI (R.). — Récents **travaux exécutés à la gare Saint-Lazare** et à ses accès. (6 500 mots & fig.)

1931 621 .134 .5 (.42)
Revue générale des chemins de fer, juin, p. 591.
OUDET. — Note sur le **graissage des locomotives** anglaises. (2 200 mots & fig.)

1931 625 .232 (.44)
Revue générale des chemins de fer, juin, p. 596.
LION. — Note sur les **voitures transatlantiques** du réseau de l'Etat. (2 300 mots & fig.)

1931 385. (09 (.498)
Revue générale des chemins de fer, juin, p. 601.
Rapport sur la **situation** des Chemins de fer roumains. (10 000 mots & fig.)

1931 313 .385 (.485)
Revue générale des chemins de fer, juin, p. 614.
Statistique pour les années 1925 à 1929 des chemins de fer de l'Etat suédois. (4 000 mots.)

1931 385 .113 (.64)
Revue générale des chemins de fer, juin, p. 620.
Les **résultats d'exploitation** de la Compagnie des chemins de fer du Maroc pour l'exercice 1929. (6 700 mots & carte.)

1931 385. (09 (.61)
Revue générale des chemins de fer, juin, p. 635.
Cinquante ans d'exploitation des chemins de fer tunisiens. (3 000 mots & fig.)

1931 656 .211 .1
Revue générale des chemins de fer, juin, p. 642.
Traversée des gares en vitesse sur la voie unique. (900 mots & fig.)

Revue politique et parlementaire. (Paris.)

1931 385 .1 (.4)
Revue politique et parlementaire, 10 mai, p. 304.
COLSON (C.). — **Les chemins de fer en 1929 et 1930.** (6 000 mots.)

1931 385. (09 .3 (.44)

‹vue politique et parlementaire, 10 juin, p. 355.

GODFERNAUX (R.). — **Les Grands Réseaux fran-** ‹is depuis la guerre. (12 000 mots & 2 tableaux.)

In German.

Deutsche Reichsbahn. (Berlin.)

1931 656 .232

‹utsche Reichsbahn, Nr. 2, S. 52; Nr. 3, S. 73.

SPIESS. — Die **Selbstkosten** als Begriff in der Preis- ‹lkulation (nicht als Zahlengrösse). (10 Seiten.)

1931 656 .214 (.43)

‹utsche Reichsbahn, Nr. 3, S. 93.

JAKOBI. — **Grenzlandbahnen.** (9 Seiten mit Karten.)

1931 621 .392, 624 & 69

‹utsche Reichsbahn, Nr. 5, S. 109.

SCHAPER. — Das **Schweissen im Ingenieurhochbau** ‹d im Brückenbau. (7 Seiten mit Zeichn. & Abb.)

1931 656 .235 (.43)

‹utsche Reichsbahn, Nr. 5, S. 120.

Tiertarifreform. (3 Seiten.)

1931 656 .235 (.43)

‹utsche Reichsbahn, Nr. 6, S. 131.

KRAUS. — Die Gütertarifpolitik der Deutschen ‹ichsbahn. (12 Seiten.)

1931 656 .23 (.43)

‹utsche Reichsbahn, Nr. 7, S. 160.

BECK. — **Reichsbahn und Spedition.** (9 Seiten.)

1931 621 .138 .5 (.43) & 625 .26 (.43)

‹utsche Reichsbahn, Nr. 8, S. 178.

KÜHNE. — **Werkstättendienst** der Deutschen ‹ichsbahn. (12 Seiten.)

1931 624 (.43)

‹utsche Reichsbahn, Nr. 9, S. 203.

SCHAPER. — Die über die grossen deutschen Ströme ‹hrenden **Eisenbahnbrücken** (Elbebrücken in Deutsch- ‹nd.) (Fortsetzung folgt.) (12 Seiten mit Abb.)

1931 656 .232

‹utsche Reichsbahn, Nr. 9, S. 215.

PÄTZOLT. — Die **Tarifkartei** im **Auskunftsdienst** ‹r Deutschen Reichsbahn-Gesellschaft. (2 Seiten.)

Elektrische Bahnen. (Berlin.)

1931 621 .335

‹ektrische Bahnen, Mai, S. 129.

UEBERMUTH (W.). — **Hochspannungs-Druckluft-** ‹alter für **Wechselstrom-Lokomotiven.** (4 500 Wörter ‹ Abb.)

1931 621 .335 (.45)

Elektrische Bahnen, Mai, S. 136.

SACHS (K.). — Neuere **Gleichstromlokomotiven** der Italienischen Staatsbahnen. (Fortsetzung.) (10 500 Wörter & Abb.)

1931 621 .335 (.436)

Elektrische Bahnen, Mai, S. 153.

LINSINGER (E.). — 1 Do 1 **Schnellzugslokomotive** Reihe 1670 der Oesterreichischen Bundesbahnen. (2 200 Wörter & Abb.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 621 .33 (.439)

Elektrotechnische Zeitschrift, Heft 20, 14. Mai, S. 635.

Elektrisierung der Hauptlinie Budapest-Hegyeshalom. (1 400 Wörter & Karte.)

1931 621 .33 (.485)

Elektrotechnische Zeitschrift, Heft 24, 11. Juni, S. 773.

Die **Elektrisierung** der Staatsbahn Stockholm-Malmö. (600 Wörter.)

Glasers Annalen. (Berlin.)

1931 621 .131 .3 & 621 .134 .3

Glasers Annalen, Heft 9, 1. Mai, S. 155.

ACHTERBERG (Th.). — Über die rechnerische Vorausbestimmung der günstigsten **Fahrgeschwindigkeit von Kolbenheissdampflokomotiven** einstufiger Dampfdehnung. (3 200 Wörter & Abb.)

1931 621 .43

Glasers Annalen, Heft 10, 15. Mai, S. 163.

LAUDAHN (W.). — **Schnellaufende Dieselmotoren.** (Fortsetzung folgt.) (3 200 Wörter & Abb.)

1931 621 .134 .3

Glasers Annalen, Heft 11, 1. Juni, S. 171.

ACHTERBERG (Th.). — Über die rechnerische Vorausbestimmung der günstigsten **Fahrgeschwindigkeit von Kolbenheissdampflokomotiven** einstufiger Dampfdehnung. (2 600 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1931 656 .212 (.432)

Organ für die Fortschr. des Eisenbahnw., Heft 1-2, 10. Januar, S. 1.

DIE RATIONALISIERUNG DES VERSCHIEBE-BAHNHOFS DRESDEN-FRIEDRICHSTADT.

POKORNÝ. — Eigenart der **Aufgaben des Verschiebebahnhofs** Dresden-Friedrichstadt. (Seite 2.)

FROHNE. — **Betriebswissenschaftliche Untersuchungen.** (Seite 4.)

LEHMANN. — **Sicherheitseinrichtungen** und Fernmeldeanlagen. (Seite 30.)

FROHNE. — Der **Ablauf** mit Rangierzettel. Seite 36.)

BESSER (E.). — **Lichttechnische Sonderausführungen.** (Seite 38.)

FROHNE. — **Ablauf** mit veränderlichem **Ablaufpunkt.** (Seite 41.)

MASSUTE. — Ablaufdynamische Untersuchungen des veränderlichen **Ablaufpunktes.** (Seite 46.)

FROHNE. — 1 Teil. Zustand vor der Rationalisierung. Grundlagen für die **selbsttätige Weichenstellanlage.** Erfahrungen. (Seite 51.)

LEHMANN. — 2. Teil. Die technische Durchbildung der **selbsttätigen Weichenstellanlage.** (Seite 56.)

FROHNE. — Die **Seilablaufanlage.** 1. Teil. Betriebliche Grundlagen und allgemeine Beschreibung. (Seite 60.)

DIETRICH (J.). — 2. Teil. Die maschinentechnischen Einrichtungen der **Seilablaufanlage.** (Seite 68.)

SELTMANN. — 3. Teil. Die **elektrotechnischen Einrichtungen** der Seilablaufanlage. (Seite 78.)

BÄSELER. — Das **Seil im Eisenbahnbetrieb.** (Seite 83.) (Ingesamt : 61 000 Wörter & Abb.)

1931 — **621 .134 .1**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 85.

BODNAR (L.). — Über die **Verteilung der Masse der Treibstange** auf den **Kreuzkopf** und **Kurbelzapfen.** (3 600 Wörter & Abb.)

1931 — **656 .212 .5**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 90.

OVERBECK (F.). — Ein einheitliches **Verschiebe- und Ablaufweichensystem.** (4 500 Wörter & Abb.)

1931 — **625 .113**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 94.

BLOSS. — Übergangsbogen und Sinuslinie. (2 300 Wörter & Abb.)

1931 — **625 .17**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 97.

FAATZ. — Gefahren des **Hochstopfens von Gleisen.** (1 000 Wörter & Abb.)

1931 — **656 .253**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 99.

BLOCH (L.). — Die Sichtbarkeit von **Lichttagessignalen.** (2 300 Wörter & Abb.)

1931 — **625 .17**

Organ für die Fortschr. des Eisenbahnw., Heft 3, 1. Februar, S. 102.

BLUM (H.). — Ursachen der **Frosthügel im Eisenbahn- und Strassenbau** und Mittel zu deren Verhütung. (5 000 Wörter & Abb.)

1931 — **625 .143. (0**

Organ für die Fortschr. des Eisenbahnw., Heft 4, 15 Februar, S. 109.

GRUENEWALDT (V.). — Die **Knicksicherheit** des **lückenlosen Gleises.** (5 100 Wörter & Abb.)

1931 — **621 .134 .1**

Organ für die Fortschr. des Eisenbahnw., Heft 4, 15 Februar, S. 116.

SCHNEIDER (L.). — Die Beanspruchung der **Rohrwalzverbindungen** eines Heizrohrkessels. (1 800 Wörter & Abb.)

1931 — **621 .135 .2**

Organ für die Fortschr. des Eisenbahnw., Heft 4, 15 Februar, S. 118.

KOCH (L.). — Über lose **Radreifen** an Lokomotiven. (3 500 Wörter & Abb.)

1931 — **625 .216**

Organ für die Fortschr. des Eisenbahnw., Heft 4, 15 Februar, S. 123.

FÜSGEN (P.). — Die **Flüssigkeitspuffer** an Eisenbahnfahrzeugen. (800 Wörter.)

1931 — **621 .134 .2 (.436)**

Organ für die Fortschr. des Eisenbahnw., Heft 5, 1. März, S. 129.

LEHNER (A.). — Die Entwicklung der **Ventilsteuerungen** bei den Osterreichischen Bundesbahnen. (4 700 Wörter & Abb.)

1931 — **621 .135 .2 & 625 .212**

Organ für die Fortschr. des Eisenbahnw., Heft 5, 1. März, S. 138.

VON CAESAR. — **Abgenutzte Radreifen** und **klaffende Weichenzungen.** (3 800 Wörter & Abb.)

1931 — **621 .138 (.43)**

Organ für die Fortschr. des Eisenbahnw., Heft 6, 15. März, S. 147.

MECKEL (A.). — Die **Behandlung der Verschleissteile** bei den Einheitslokomotiven der Deutschen Reichsbahn. (8 000 Wörter & Abb.)

1931 — **656 .212 .4**

Organ für die Fortschr. des Eisenbahnw., Heft 6, 15. März, S. 160.

AMMANN (O.). — **Rangiertechnik.** (9 600 Wörter & Abb.)

1931 — **621 .122 .8 & 621 .43**

Organ für die Fortschr. des Eisenbahnw., Heft 7, 1. April, S. 167.

VON SANDEN (K.) & WOHLSCHLÄGER (H.). — **Eine neue Lösung des Problems der Diesellokomotive** mit unveränderbarem Antrieb. (3 500 Wörter & Abb.)

1931 — **621 .132 .8 & 621 .43**

Organ für die Fortschr. des Eisenbahnw., Heft 7, 1. April, S. 171.

GEIGER (J.). — Die Wirtschaftlichkeit von **Diesellokomotiven.** (3 900 Wörter & Abb.)

1931 — **621 .132 .8 & 621 .43**

Organ für die Fortschr. des Eisenbahnw., Heft 7, 1. April, S. 176.

FRIEDRICH (K.). — **Dieseltriebwagen** mit quergestellten **Motoren.** (3 300 Wörter & Abb.)

1931 621 .132 .8 (.43)

Organ für die Fortschr. des Eisenbahnw., Heft 7, 1. April, S. 181.

DEKER (W.) — **Henschel-Schienenomnibus.** (1 500 Wörter & Abb.)

1931 625 .143 .4 (.43)

Organ für die Fortschr. des Eisenbahnw., Heft 8, 15. April, S. 191.

WATTMANN (D.). — Die **Lückentafel** der Reichsbahn und der Wärmeschub im Gleis. (1 300 Wörter & Abb.)

1931 625 .143 .4

Organ für die Fortschr. des Eisenbahnw., Heft 8, 15. April, S. 194.

NEMESEK (J.). — Schienenthermometer, Wärmelücken und Regeln für das **Verlegen von Schienen.** (4 800 Wörter & Abb.)

1931 621 .7

Organ für die Fortschr. des Eisenbahnw., Heft 8, 15. April, S. 200.

BREWITT. — Anregungen zum Ausbau des **aluminothermischen Zwischengussverfahrens** für Schienenschweissungen. (1 000 Wörter.)

1931 656 .256 (.436)

Organ für die Fortschr. des Eisenbahnw., Heft 9, 1. Mai, S. 220.

ZULEGER. — **Gleissperrschalter** (Bauart Adler und Ing. Hengl) für Bahnhofblockwerke der Österreichischen Bundesbahnen. (800 Wörter & Abb.)

1931 385 .(09 (.460)

Organ für die Fortschr. des Eisenbahnw., Heft 9, 1. Mai, S. 221.

SCHNEIDER (L.). — Das **spanische Eisenbahnnetz** und sein rollendes Material. (2 500 Wörter & Abb.)

1931 621 .133 .4

Organ für die Fortschr. des Eisenbahnw., Heft 9, 1. Mai, S. 225.

FRIEDRICH (M.). — **Sauggerät** Bauart Schmeitzner für die Rauchkammerlösche der **Lokomotiven.** (900 Wörter & Abb.)

1931 625 .245 & 656 .225

Organ für die Fortschr. des Eisenbahnw., Heft 10, 15. Mai, S. 229.

EBERT. — Technische Fragen bei der Einführung von **Behältern.** (5 500 Wörter & Abb.)

1931 656 .212 .5

Organ für die Fortschr. des Eisenbahnw., Heft 10, 15. Mai, S. 236.

BLOCH (A.). — Wahrscheinlichkeitsrechnung im **Ablaufbetrieb.** (5 100 Wörter & Abb.)

1931 625 .151

Organ für die Fortschr. des Eisenbahnw., Heft 10, 15. Mai, S. 242.

BÄSELER. — Geometrische Eigenschaften der **Bogenweichen.** (500 Wörter & Abb.)

1931 621 .13 (.52), 621 .335 (.52) & 625 .2 (.52)

Organ für die Fortschr. des Eisenbahnw., Heft 11, 1. Juni, S. 247.

PUTZE (O). — Die **Betriebsmittel** und ihre Entwicklung bei der **Japanischen Staatsbahn.** (6 900 Wörter & Abb.)

1931 625 .142 .2 (.43) & 625 .151 (.43)

Organ für die Fortschr. des Eisenbahnw., Heft 11, 1. Juni, S. 257.

VON HÖLZEL. — Vorrichten der **Holzschwellen** für die Reichsbahnweichen im Schwellenwerk Kirchseeon. (2 000 Wörter & Abb.)

Verkehrstechnische Woche. (Berlin.)

1931 656 .1

Verkehrstechnische Woche, Nr. 1, S. 3; Nr. 2, S. 18.

KLEFFEL. — Die Novelle zur **Kraftfahrzeugverkehrsordnung.** (10 Seiten.)

1931 656 .254

Verkehrstechnische Woche, Nr. 2, S. 13; Nr. 3, S. 31; Nr. 4, S. 42; Nr. 5, S. 54.

ARNDT. — Die selbsttätige **Sicherung der Wegübergänge** in Schienenhöhe. (19 Seiten mit Abb. & Zeichnungen.)

1931 38

Verkehrstechnische Woche, Nr. 5, S. 49.

MOST. — **Kommunale Verkehrspolitik.** (6 Seiten.)

1931 656 .212 .5

Verkehrstechnische Woche, Nr. 6, S. 62.

Die **Profilgestaltung** zum **Zerlegen der Güterzüge** mit Lokomotiven über den Ablaufberg. (5 Seiten, mit Zeichnungen.)

1931 656 .23

Verkehrstechnische Woche, Nr. 7, S. 78.

DEISLER. — Die Auslobung als Mittel der **Eisenbahntarifpolitik.** (1 Seite.)

1931 625 .245 & 656 .225

Verkehrstechnische Woche, Nr. 7, S. 80.

WENTZEL. — Zur Frage des **Behälterverkehrs** (Fahrbare oder nicht fahrbare Behälter?). (1 Seite.)

1931 656 .212 .4

Verkehrstechnische Woche, Nr. 8, S. 88.

Studiengesellschaft für **Rangiertechnik.** Jahresbericht der Studiengesellschaft für Rangiertechnik. (Geschäftsjahr 1930.) (2 Seiten.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 669 .1

Zeitschr. Ver. deutsch. Ing., Nr. 21, 23. Mai, S. 649.

HILPERT (A.). — **Werkstoffveränderungen** der mit Schneidbrennern bearbeiteten **Baustähle.** (3 500 Wörter & Abb.)

1931 621 .116
Zeitschr. Ver. deutsch. Ing., Nr. 21, 23. Mai, S. 654.
ULRICH. — Gestaltung von gewellten Teilkammern für **Dampfkessel.** (1 900 Wörter & Abb.)

1931 62. (01 & 624 .2
Zeitschr. Ver. deutsch. Ing., Nr. 21, 23. Mai, S. 705.
THUM (A.). — Zur Frage der **Sicherheit in der Konstruktionslehre.** (4 000 Wörter & Abb.)

1931 385
Zeitschr. Ver. deutsch. Ing., Nr. 24, 13 Juni, S. 751.
PIRATH (C.). — Die Stellung der **Verkehrswirtschaft** in der Gesamtwirtschaft. (10 500 Wörter & Abb.)

1931 621 .392
Zeitschr. Ver. deutsch. Ing., Nr. 24, 13 Juni, S. 759.
ULBRICHT (R.). — **Geschweisste Rohrverbindungen** im Stahlhochbau. (1 000 Wörter & Abb.)

1931 656 .25
Zeitschr. Ver. deutsch. Ing., Nr. 24, 13 Juni, S. 761.
Eisenbahn-Sicherungsanlagen — Ein Rundblick. (3 200 Wörter & Abb.)

Zeitung des Vereins deutscher Eisenbahnverwaltungen. (Berlin.)

1931 651
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 3, S. 61.
UNVERZAGT. — Rationalisierung des Ermittlungsdienstes. (7 Seiten.)

1931 625 .213
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 3, S. 68.
POHNER. — Das **Reibungsgleichgewicht** eines 3-achsigen Lenkachs-Eisenbahnwagens dessen Endachsen von der Seitenverschieblichen Mittelachse gesteuert werden. (15 Seiten mit Zeichnungen.)

1931 625 .6 (0.
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 5, S. 122.
HELLMANN. — Wirtschaftliche Gedanken über den **Bau neuer Nebenbahnen.** (1 Seite.)

1931 621 .13 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 5, S. 123.
FIEDLER. — **Lokomotivwirtschaft.** (14 Seiten mit Diagr.)

1931 656 .23
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 6, S. 153.
SANTER. — Zur **Tarifpolitik** autonomer Staatsbahnen. (6 Seiten.)

1931 656 .29
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 6, S. 160.
MEHLHOSE. — Die vorbildliche Ausrüstung eines **Hilfszuges.** (3 Seiten mit Abb.)

1931 656 .23 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 6, S. 181.
Reichsbahn und Spedition. — Rationalisierung und Gebührensenkung. (2 Seiten.)

1931 625 .1 (.497 .1)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 7, S. 187.
Eisenbahnbauten im serbischen Teil Jugoslawiens. (2 Seiten mit Karte.)

1931 621 .132 .8 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 201.
BÄSELER. — Gedanken zum **Schnellverkehr.** — Propellerwagen. (6 Seiten mit Zeichnungen.)

1931 385 .63
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 208.
JOSEPH. — **Rechtliche Regelung des internationalen Expressgutverkehrs.** (3 Seiten.)

1931 625 .162
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 211.
HERMANN. — **Beeinträchtigung der Übersichtlichkeit an schienengleichen Wegübergängen.**

1931 385. (061 .2)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 218.
Zusatzbestimmungen des Vereins D. E. V. zum I. Ü. C. (3 Seiten.)

1931 656 .23 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 233.
BECK. — **Reichsbahn und Spedition.** (10 Seiten.)

1931 656 .234 (.481) & 656 .235 (.481)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 244.
PASZKOWSKI. — **Stückgut- und Personentarifreform** in Norwegen. (4 Seiten.)

1931 656 .254 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 8, S. 248.
WESEMANN. — Zwei Jahre **Zugüberwachung,** Minden, Westfalen. Dispatching System. (5 Seiten, Zeichn., Abb. & Diagr.)

In English.

Electric Railway Journal. (New York.)

1931 385 .524 (.73)
Electric Railway Journal, June. p. 291.
BUFFE (F. G.). — **Profit sharing plan** adopted at Kansas City. (2 200 words.)

1931 **621 .338 (.73)**
ectric Railway Journal, June, p. 294.
Loading speed a major factor in **design of New York bway cars.** (2 400 words & fig.)

1931 **656 .254 (.73)**
ectric Railway Journal, June, p. 298.
WOOLLEY (J. F.). — Service improved with **auto-atic schedule checker.** (1 200 words & fig.)

1931 **621 .335 (.73)**
ectric Railway Journal, June, p. 300.
PERKINSON (T. F.). — Fort Dodge interurban gets ·ton **freight locomotive.** (600 words & fig.)

1931 **385 .113 (.73)**
ectric Railway Journal, June, p. 301.
Industry statistics for 1930 reflect **business situa-**on. (1 400 words & 15 tables.)

1931 **385 .113 (.73)**
ectric Railway Journal, June, p. 310.
Trend of **revenues and expenses.** (Electric railways.) ables.)

Engineer. (London.)

1931 **624 .32 (.73)**
gineer, No. 3932, 22 May, p. 562.
The Martinez-Benicia **bridge,** Suisun Bay. (2 200 rds & fig.)

1931 **621 .33 (.42)**
gineer, No. 3932, 22 May, p. 563.
Electrification of the Manchester-Altrincham Rail-y. (4 000 words & fig.)

1931 **669 .1 (06 (.42)**
gineer, No. 3932. 22 May, p. 564.
he **Iron and Steel Institute** (Summary of Proceed-s). (7 000 words.)

1931 **624 .51 (.73)**
gineer. No. 3933, 29 May, p. 590.
The Hudson river **bridge.** (4 500 words & fig.)

1931 **621 .87 (.42)**
gineer, No. 3933, 29 May, p. 604.
Large **breakdown cranes.** (3 000 words & fig.)

1931 **621 .331 (.73)**
gineer, No. 3933, 29 May, p. 606.
3 000-volt **traction rectifiers.** (1 500 words & fig.)

1931 **624 .3 (.42)**
gineer, No. 3933, 29 May, p. 616.
Montrose **bridge.** (2 000 words & 5 tables.)

1931 **625 .24 (0 (.42)**
gineer, No. 3933, 29 May, p. 620.
BREWER (F. W.). — Bigger **wagons** for British rail-ys. (1 700 words.)

1931 **621 .138 .5 (.942)**
Engineer, No. 3934, 5 June, p. 621.
JENKYNS (C. P.). — A new Australian **locomotive works.** (5 000 words & fig.)

1931 **624 .62 (.73)**
Engineer, No. 3935, 12 June, p. 647.
The Kill van Kull **bridge,** New York. (5 500 words & fig.) (To be continued.)

Engineering. (London.)

1931 **624 .8 (.71)**
Engineering, No. 3410, 22 May, p. 662.
Double-leaf rolling **bascule bridge;** Welland ship canal. (1 600 words & fig.)

1931 **669 .1 (06 (.42)**
Engineering, No. 3410, 22 May, p. 679.
The **Iron and Steel Institute** (Summary of Proceedings). (7 400 words.)

1931 **624 .8 (.71)**
Engineering, No. 3411, 29 May, p. 691.
Operating and locking gear of double-leaf rolling lift **bascule bridge;** Welland ship canal. (3 200 words & fig.)

1931 **669**
Engineering, No. 3411, 29 May, p. 713.
JENKINS (C. H. M.). — Some **alloys** for use at **high temperatures.** (4 000 words & fig.)

1931 **621 .165**
Engineering, No. 3411, 29 May, p. 716.
GIBB (C. D.). — Post-war **land turbine development.** (1 700 words & fig.)

1931 **625 .1 (.43)**
Engineering, No. 3411, 29 May, p. 718.
Heavy **road-transport trailer.** (600 words.)

1931 **691**
Engineering, No. 3412, 5 June, p. 722.
MANNING (G. P.). — Varieties of **flat-slab construction.** (3 200 words & fig.)

1931 **669 .1**
The Metallurgist, supplement to the Engineer, May, p. 65.
The cheapest **steel** or the best. (1 000 words.)

1931 **669**
The Metallurgist, supplement to the Engineer, May p. 67.
Aluminium alloys and their **heat treatment.** (3 200 words.)

1931 **625 .143**
The Metallurgist, supplement to the Engineer, May p. 69.
Abrasion of tyres and rails. (1 600 words & tables.)

1931 621 .392 & 669 .1
The Metallurgist, supplement to the Engineer, May p. 73.
Some German views on **welding.** (2 400 words.)

1931 691
Engineering, No. 3413, 12 June, p. 754.
MANNING (G. P.). — Varieties of **flatslab construction.** (1 800 words & fig.)

1931 656 .253 (.43)
Engineering, No. 3413, 12 June, p. 776.
Ironclad terminal **box for track circuits.** (4 500 words & 5 tables.)

1931 621 .132 .3 (.71 & 621 .132 .5 (.71)
Engineering, No. 3413, 12 June, p. 780.
BOWEN (H. B.). — 2-10-4 type **multi-pressure locomotive**; Canadian Pacific Railway. (3 000 words & fig.)

Engineering News-Record. (New York.)

1931 624 .8 (.73)
Engineering News-Record, No. 20, 14 May, p. 796.
Design and **erection of a 534-ft. lift span.** (Burlington-Bristol toll bridge). Two articles : **Light steel floor** governs long lift-span design, by E. E. Paul & **Cantilever erection of a 534-ft. lift span,** by H. G. Veeder. (4 300 words & fig.)

1931 656 .212 (.73)
Engineering News-Record, No. 20, 14 May, p. 802.
Express terminal at Chicago for Chicago & North Western Railway. (900 words & fig.)

1931 624 .51 (.73)
Engineering News-Record, No. 22, 28 May, p. 890.
The Golden Gate **bridge.** (3 500 words & fig.)

1931 624 .7 & 621 .392 (.73)
Engineering News-Record, No. 22, 28 May, p. 894.
Bridge floor built of precast concrete slabs secured by welding. (1 000 words & fig.)

1931 624 .8 (.73)
Engineering News-Record, No. 23, 4 June, p. 918.
ROAKE (S. A.). — Design and **erection of the Martinez-Benicia bridge superstructure.** (4 200 words & fig.)

1931 625 .4 (.82)
Engineering News-Record, No. 23, 4 June, p. 923.
Buenos Aires **subway** 4.6 miles long built in twenty months. (3 200 words & fig.)

Institution of Engineers, Australia. (Sydney.)

1931 624 .1 (.943)
Institution of Engineers, Australia, April. p. 117.
BOULTON (G. O.). — The Grey Street **bridge,** Brisbane. Construction of the **foundations.** (4 500 words, 2 tables & fig.)

Journal of the Institute of Transport. (London

1931 6
Journal of the Institute of Transport, June, p. 378.
BELL (R.). — **Transport developments** in 19 (8 000 words.)

1931 656 (.4
Journal of the Institute of Transport, June, p. 388.
STANLEY (Sir A.). — The final report of t **Royal Commission on transport.** (12 600 words.)

1931 65
Journal of the Institute of Transport, June, p. 403.
HARVERSON (P. A.). — The **co-ordination of ra and road passenger services.** (4 500 words.)

Mechanical Engineering. (New York.)

1931 614 .8 (.73
Mechanical Engineering, June, p. 443.
WALLACE (L. W.). — **Economic aspects of indus trial-casualty reduction.** (4 800 words.)

Modern Transport. (London.)

1931 656 .212 (.42
Modern Transport, No. 636, 23 May, p. 3.
Great Western **Railway** and the Midlands. (1 90 words & fig.)

1931 621 .33 (.436
Modern Transport, No. 636, 23 May, p. 6.
Electrification of Vienna City **Railway.** (3 500 word & fig.)

1931 385. (09) (.45
Modern Transport, Italian Congress section, No. 637 30 May, p. III.
Historical development of Italian State Railways (2 700 words & fig.)

1931 621 .33 (.45)
Modern Transport, Italian Congress section, No. 637 30 May, p. IV.
Railway **electrification** in Italy. (6 500 words & fig.)

1931 656 .211 (.45) & 725 .31 (.45
Modern Transport, Italian Congress section, No. 637 30 May, p. IX.
The new **Central station** at Milan. (3 800 words & fig.)

1931 625 .11 (.45)
Modern Transport, Italian Congress section, No. 637, 30 May, p. XVI.
New railway through the Stelvio Pass. (1 500 words & fig.)

1931 624 (.45)
Modern Transport, Italian Congress section, No. 637, 30 May, p. XX.
Railway progress in Italy. (1 500 words & fig.)

1931 **656 .213 (.45)**
odern Transport. Italian Congress section, No. 637, 30 May, p. XXIII.
An extensive **dock and harbour undertaking.** (3 800 ords & fig.)

1931 **621 .132 .3 (.45)**
odern Transport. Italian Congress section, No. 637, 30 May, p. XXVII.
Express passenger locomotives for Italian State Rail-ays. (900 words & fig.)

1931 **725 .31 (.45)**
odern Transport. Italian Congress section, No. 637, 30 May, p.XXIX.
The **maritime station** at Genova. (1 800 words & fig.)

1931 **725 .35 (.45)**
odern Transport. Italian Congress section, No. 637, 30 May, p. XXXIII.
Cold storage in Italy. (1 000 words & fig.)

1931 **621 .33 (.42)**
odern Transport, No. 637, 30 May, p. 3.
Undue optimism of the Weir Committee. (2 700 ords.)

1931 **621 .132 .3 (.71) & 621 .132 .5 (.73)**
odern Transport, No. 637, 30 May, p. 7.
New **locomotives** for Canadian Railways. (1 500 words fig.)

1931 **347 .763 (.42) & 656 .1 (.42)**
odern Transport, No. 637, 30 May, p. 14.
PITTARD (R. G.). — The **Road Traffic Act** 1930. 500 words.)

1931 **625 .24 (.0 (.44)**
odern Transport, No. 638, 6 June, p. 2.
20-ton **wagons.** (900 words.)

1931 **621**
odern Transport, No. 638, 6 June, p. 3.
MALONE (J. F. J.). — **New type of prime mover.** 800 words.)

1931 **621 .132 .8 (.42)**
odern Transport, No. 638, 6 June, p. 7.
« **Garratt** » **type locomotives** for Kenya and Uganda ailway. (900 words & fig.)

1931 **625 .24 (.0 (.42)**
odern Transport, No. 638, 6 June, p. 9.
High-capacity **wagons.** (1 400 words.)

1931 **347 .763 (.42) & 656 .1 (.42)**
odern Transport, No. 638, 6 June, p. 15.
Operation of the **Road Traffic Act.** (1 800 words.)

1931 **625 .62 (.45)**
odern Transport, No. 639, 13 June, p. 3.
Transport developments in Milan. (3 300 words & fig.)

1931 **625 .232 (.43)**
Modern Transport, No. 639, 13 June, p. 9.
New **rolling stock** for German Railways. (1 200 words & fig.)

Proceedings, American Society of Civil Engineers. (New York.)

1931 **693**
Proceed. Amer. Soc. civil Eng., May, p. 675.
HALL (W. M.). — **Manufacturing concrete** of uniform quality. (11 000 words, 4 tables & fig.)

Proceedings, Institution of Civil Engineers. (London.)

1931 **627 (.931) & 656 .213 (.931)**
Proceed., Institut. of Civil Eng., No. 230, p. 1.
WILLIAMS (C. J. R.). — The development of Lyttelton **Harbour,** New Zealand. Paper and discussion. (15 500 words.)

1931 **656 .213 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 25.
HINDERMARSH (R. F.). — Tyne Commission **Quay,** North Shields. Paper and discussion. (11 500 words.)

1931 **627 (.54)**
Proceed., Institut. of Civil Eng., No. 230, p. 40.
BRISTOW (R. Ch.). — Cochin **Harbour Works.** Paper and discussion. (15 500 words, 10 tables & fig.)

1931 **624 .3 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 101.
SMITH (H. D.). — **Reconstruction** of Liskeard **Viaduct,** and scheme for **reconstruction** of the approach **spans** of the Royal Albert **Bridge,** Saltash. Paper and discussion. (6 500 words & fig.)

1931 **624 .3 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 115.
GIBBONS (F.). — **Reconstruction of approach spans,** Royal Albert **bridge,** Saltash. Paper and discussion. (5 500 words & 3 tables.)

1931 **625 .43 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 125.
ALEXANDER (J.). — **Reconstitution of Kent and Leven viaducts :** Furness section of the London Midland & Scottish Railway. Paper and discussion. (4 000 words & fig.)

1931 **624 .62 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 143.
GROVES (G. L.). — The new Wearmouth **bridge,** Sunderland. Paper and discussion. (14 500 words.)

1931 **624 .62 (.42)**
Proceed., Institut. of Civil Eng., No. 230, p. 167.
ANDERSON (D.). — Tyne **bridge,** Newcastle. Paper and discussion. (14 500 words.)

1931 625 .13 (.54)
Proceed., Institut. of Civil Eng., No. 230, p. 204.
HASKEW (B. B.). — **The rebuilding of the Bassein bridges** on the Bombay, Baroda and Central India Railway. Paper and discussion. (16 500 words, 2 tables & fig.)

1931 625 .13 (.54)
Proceed., Institut. of Civil Eng., No. 230, p. 234.
EVERALL (W. T.). — **The reconstruction of the Attock bridge** across the river Indus on the North Western Railway, India. Paper and discussion. (15 000 words & fig.)

Railway Age. (New York.)

1931 656 .2 (.73)
Railway Age, No. 19, 9 May, p. 899.
LISMAN (F. J.). — If not an « Umpire », then what ? (3 800 words.)

1931 625 .242 (.73) & 625 .246 (.73)
Railway Age, No. 19, 9 May, p. 902.
Pullman builds **all-welded hopper cars** for the Chicago Great Western. (2 000 words & fig.)

1931 656 (06 (.73)
Railway Age, No. 19, 9 May, p. 905.
Transport competition discussed. (5 600 words.)

1931 621 .133 .7 (.73)
Railway Age, No. 19, 9 May, p. 909.
Water supplies reach danger line. (3 800 words & fig.)

1931 621 .132 .5 (.71)
Railway Age, No. 19, 9 May, p. 913.
Canadian Pacific Railway completes **double-pressure three-cylinder locomotive.** (1 000 words & fig.)

1931 656 .225 (.73) & 656 .236 .1 (.73)
Railway Age, No. 19, 9 May, p. 916.
Container rates held too low. (5 000 words.)

1931 621 .7 (09) (.73)
Railway Age, No. 20, 16 May, p. 964.
Baldwin celebrates its **hundredth birthday.** (7 000 words & fig.)

1931 656. (06 (.73)
Railway Age, No. 20, 16 May, p. 972.
Favor impartial **transport survey.** (3 500 words.)

1931 621 .139 (.73), 625 .18 (.73) & 625 .27 (.73)
Railway Age, No. 20, 16 May, p. 975.
Railway purchases and inventories lower in 1930. (8 500 words & fig.)

1931 614 .8 (.73) & 656 .28 (.73)
Railway Age, No. 20, 16 May, p. 981.
Safety performance in 1930. Record for Chicago & North Western Railway. (4 200 words & fig.)

1931 656 .25 (06 (.73
Railway Age, No. 20, 16 May, p. 989.
Signal section meets in New York. (6 500 words & fig.)

1931 625 .24 (
Railway Age, No. 21, 23 May, p. 1012.
RICE (H. R.). — How long should a **hopper car** last (4 300 words & fig.)

1931 385 .1 (.73) & 656 .2 (.73
Railway Age, No. 21, 23 May, p. 1022.
Railroads must co-operate. (3 600 words.)

1931 621 .139 (.06 (.73), 625 .18 (06 (.73 & 625 .27 (06 (.73
Railway Age, No. 21, 23 May, p. 1025.
Purchases and stores Division holds annual Convention. (20 000 words & fig.)

1931 656 .1 (.73)
Railway Age, No. 21, 23 May, p. 1043.
FORBES (F. R.). — **Meeting competition** with equal service and rates. (2 200 words & fig.)

1931 656 .225 (.73)
Railway Age, No. 22, 30 May, p. 1060.
North Western **less-than-carload delivery** approximates express service. (3 000 words & fig.)

1931 725 .31 (.73)
Railway Age, No. 22, 30 May, p. 1063.
Tulsa, Oklahoma, opens Union **depot.** (3 000 words & fig.)

1931 656 (.73)
Railway Age, No. 22, 30 May, p. 1067.
DUNN (S. O.). — Our national **transportation** problem. (5 200 words & fig.)

1931 656 .257 (.73)
Railway Age, No. 22, 30 May, p. 1071.
Chicago Great Western saves $ 7 000 annually by **remote control of tunnel interlockings.** (1 300 words & fig.)

1931 656 .26 (.73)
Railway Age, No. 22, 30 May, p. 1073.
Milwaukee profits by improved **draft-gear conditions.** (2 700 words & fig.)

1931 614 .8 (.73) & 656 .28 (.73)
Railway Age, No. 22, 30 May, p. 1076.
Railroad **accidents** reach lowest point. (5 800 words & fig.)

Railway Engineer. (London.)

1931 625 .14
Railway Engineer, May, p. 171.
Speed and the permanent way. (900 words.)

1931 656 .25
Railway Engineer, May, p. 173.
A signalling demonstration track. (3 600 words & fig.)

1931 **621 .138 .5 (.54) & 625 .26 (.54)**
ailway Engineer, May, p. 179.
Trichinopoly **workshops,** South Indian Railway. (9 900 ords & fig.)

1931 **625 .172**
ailway Engineer, May, p. 189.
Permanent way maintenance. (1 400 words & fig.)

1931 **621 .138 .6 (.42)**
ailway Engineer, May, p. 190.
New **furnace installation** at the Swindon works, reat Western Railway. (1 800 words & fig.)

1931 **621 .132 .5 (.54)**
ailway Engineer, May, p. 192.
New metre-gauge 2-8-2 **freight locomotives,** Bombay aroda & Central India Railway. (900 words & fig.)

1931 **621 .131 .2**
ilway Engineer, May, p. 194.
The « 3-30. » — The next **locomotive** (?). A **proposed ree-cylinder arrangement** combining a large cylinder lume with a short maximum cut-off and incorporat-g a special starting device. (6 300 words & fig.)

1931 **621 .135 .4 & 625 .22**
ilway Engineer, May, p. 199.
MARSHALL (C. F. D.). — The **motion** of **railway hicles on a curved line.** VII. (3 400 words & fig.)

1931 **625 .14**
ilway Engineer, May, p. 202.
HEARN (Sir G.). — The **permanent way** of the ture. (3 800 words.)

1931 **621 .33 (.42)**
ilway Engineer, June, p. 206.
The Weir report on Main line **electrification.** (2 400 rds.)

1931 **656 .285 (.42)**
ilway Engineer, June, p. 207.
Accidents to railway servants. (1 500 words.)

1931 **621 .135 .3**
ilway Engineer, June, p. 209.
SANDERS (T. H.). — The **influence of springs in lo-motive derailments.** (4 900 words & fig.)

1931 **625 .151**
ilway Engineer, June, p. 214.
The Sheremeteff electro-gravity **point mechanism.** 000 words & fig.)

1931 **621 .33 (.42)**
ilway Engineer, June, p. 217.
The Manchester, South Junction & Altrincham Rail-y **electrification.** (5 600 words & fig.)

1931 **621 .135 .2 (.73)**
ilway Engineer, June, p. 229.
Experimental locomotive fitted with roller bearings. 000 words & fig.)

1931 **621 .135 .4 & 625 .215**
Railway Engineer, June, p. 233.
MARSHALL (C. F. D.). — The **motion of railway vehicles on a curved line.** — VIII. (1 500 words & fig.)

1931 **621 .132 .8 & 621 .43**
Railway Engineer, June, p. 235.
Diesel locomotive design. — IV. (7 000 words & fig.)

Railway Engineering and Maintenance. (Chicago.)

1931 **625 .141 (.73)**
Railway Engineering and Maintenance, June, p. 540.
Meeting the **ballast** requirements of the Great Northern Railway. (4 200 words & fig.)

1931 **385 .587 (.73) & 625 .1 (.73)**
Railway Engineering and Maintenance, June, p. 544.
Saving half a million dollars annually. (8 500 words & fig.)

1931 **625 .142 .2 (06 (.73)**
Railway Engineering and Maintenance, June, p. 551.
Crosstie producers review available supplies. (10 000 words & fig.)

1931 **621 .133 .7 (.73)**
Railway Engineering and Maintenance, June, p. 557.
Meeting a crisis in **water supply.** (1 600 words & fig.)

Railway Gazette. (London.)

1931 **625 .243 (.42)**
Railway Gazette, No. 21, 22 May, p. 766.
Twenty-ton **vans for general merchandise** traffic, **Great Western Railway.** (200 words & fig.)

1931 **625 .1 (.45)**
Railway Gazette, No. 21, 22 May, p. 767.
The new direct Bologna-Florence Railway. (1 700 words & fig.)

1931 **656 .285 (.42)**
Railway Gazette, No. 22, 29 May, p. 797.
Accidents to railway servants. (4 200 words.)

1931 **621 .33 (.45)**
Railway Gazette, No. 22, 29 May, p. 800.
State railway **electrification** in Italy. (5 600 words & fig.)

1931 **656 .23 (.42)**
Railway Gazette, No. 23, 5 June, p. 824.
General **railway classification of merchandise** and the London & North Eastern Railway innovation. (800 words.)

1931 **621 .132 .8 (.67)**
Railway Gazette, No. 23, 5 June, p. 829.
New **Garratt locomotives** for the Kenya & Uganda Railway. (700 words & fig.)

1931 625 .245 (.42) & 656 .225 (.42)
Railway Gazette, No. 23, 5 June, p. 830.
Conveyance of transformers by rail. (600 words & fig.)

1931 625 .29 (.42)
Railway Gazette, No. 23, 5 June, p. 832.
New **breakdown equipment** for the London Underground Railways. (700 words & fig.)

1931 656 .1 (.68)
Railway Gazette, No. 23, 5 June, p. 839.
Feeding the railways. Some notes on what is being done in Rhodesia and South Africa. (1 200 words & fig.)

1931 656. (06 (.42)
Railway Gazette, No. 24, 12 June, p. 863.
BROWN (A.). — The Royal Commission on **transport and railway reform.** (2 400 words & fig.)

1931 656 .213 (.44)
Railway Gazette, No. 24, 12 June, p. 865.
New **maritime passenger station** at Havre. (500 words & fig.)

1931 625 .258 (.42)
Railway Gazette, No. 24, 12 June, p. 866.
The **eddy current rail brake.** (2 300 words & fig.)

1931 621 .134 .3 (.42)
Railway Gazette, No. 24, 12 June, p. 869.
Express locomotive with poppet valve gear, Great Western Railway. (700 words & fig.)

1931 621 .132 .6 & 621 .134 .3
Railway Gazette, No. 24, 12 June, p. 873.
New 2-10-2 **tank locomotives** for the Czecho-Slovakian State Railways. (1 000 words & fig.)

Railway Magazine. (London.)

1931 625 .4 (.42)
Railway Magazine, June, p. 445.
The Post Office **tube railway.** (2 800 words & fig.)

1931 656 .222 .1 (.7)
Railway Magazine, June, p. 459.
Modern **American locomotive performance.** No. I. (4 000 words & fig.)

Railway Mechanical Engineer. (New York.)

1931 625 .241 (.73)
Railway Mechanical Engineer, May, p. 221.
Chicago & North Western **200-ton flat-cars.** (700 words & fig.)

1931 621 .138 .5 (.73)
Railway Mechanical Engineer, May, p. 224.
The Huntington **shops** of the Chesapeake & Ohio. (6 000 words & fig.)

1931 621 .135 .
Railway Mechanical Engineer, May, p. 233.
HALL (R. F.). — **Layouts of locomotives on curve**
(2 300 words & fig.)

1931 621. 132 .5 (.73
Railway Mechanical Engineer, May, p. 237.
Two **freight locomotives designed for fast servic**
(3 500 words & fig.)

1931 625 .244 (.68
Railway Mechanical Engineer, May, p. 241.
DAWSON (W. B.). — South African **refrigerato cars.** (1 700 words & fig.)

Railway Signaling. (Chicago.)

1931 656 .253 (.73)
Railway Signaling, May, p. 149.
RICE (A. H.). — Modern **Signals and interlocking** for Napierville Junction Railway. (3 600 words & fig.

1931 656 .257 (.73)
Railway Signaling, May, p. 153.
SCOTT (W. Y.). — **All-relay interlocking** expedites traffic on the Boston & Maine. (2 800 words & fig.)

1931 656 .253 (.73)
Railway Signaling, May, p. 157.
Michigan Central makes extensive improvements in **signaling system** on 513 miles of main line. (2 9
words & fig.)

1931 656 .258 (.73)
Railway Signaling, May, p. 161.
CORREY (C. L.). — **Movable bridges and yard entrance layouts controlled from one cabin.** (3 000 words & fig.)

1931 656 .253 (.73)
Railway Signaling, May, p. 164.
New York Central **re-signals track** entering Grand Central Terminal. (3 000 words & fig.)

1931 656 .253 (.73)
Railway Signaling, May, p. 168.
SAUNDERS (J. E.). — The **signaling** of the Lackawanna **electrified territory.** (6 300 words & fig.)

1931 656 .25 (06 (.73)
Railway Signaling, May, p. 175.
Signal section meets in New York. (4 200 words & fig.)

World Power. (Edinburgh.)

1931 621 .43 & 656 .1
World Power, May, p. 382.
GODDARD (W. H.). — Progress in the **application of the Diesel or heavy oil engine to road transport.** (3 200 words.)

1931 621 .33 (.82)
...rld Power, May, p. 388.
Electrical equipment of motor coaches for the Bue... Ayres Terminal Central Railway. (1 600 words ... fig.)

1931 621 .116 & 669 .1
...orld Power, May, p. 401.
Embrittlement in boilers. (4 200 words & fig.)

In Spanish.

Gaceta de los Caminos de hierro. (Madrid.)

1931 385. (09 (.438)
...aceta de los Caminos de hierro, 20 de abril, p. 135.
Los ferrocarriles polacos y su desarollo y tráfico des......ès de la guerra. (3 700 palabras.)

1931 621 .132 .8 (.43) & 621 .43 (.43)
...aceta de los Caminos de hierro, 10 de abril, p. 121.
Las locomotoras Diesel de aire comprimido de 1 200 ...ballos de la Deutsche Reichsbahn. (2 700 palabras.)

Ingenieria y Construcción (Madrid).

1931 625 .5 (.460)
...geniera y Construcción, mayo, p. 265.
El **funicular** de Montserrat. (3 000 palabras & fig.)

Revista de Obras Pùblicas. (Madrid.)

1931 624
...vista de Obras Públicas, n° 10, 15 de mayo, p. 192.
...RIBERA (J. E.). — **Evolución decorativa de los ...entes en el siglo XX.** (1 800 palabras & fig.)

1931 621 .33 (.460)
...vista de Obras Públicas, n° 10, 15 de mayo, p. 195.
...ARCIA LOMAS (J.). — Las recientes **electrifica...nes de la Compañia de los Caminos de hierro del ...rte de España.** (6 000 palabras & fig.)

1931 625 .1 (.82)
...vista de Obras Públicas, n° 11, 1° de junio, p. 216.
...GUILAR (M.). — **Los ferrocarriles argentinos.** ...400 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1931 624 .63
...nali dei lavori pubblici, Marzo, p. 188.
...IOZZI (E.). — Applicazione delle deformazioni sis...tatiche nella **costruzione di travate in cemento ar...to.** (5 600 parole & fig.)

L'Ingegnere. (Roma.)

1931 62. (01)
L'Ingegnere, Aprile, p. 270.
PUGNO (G. M.). — **Sulla trattazione dei sistemi** elastici aventi ellissi di **elasticità** degeneri. (1 000 parole & fig.)

1931 721 .9
L'Ingegnere, Aprile, p. 271.
NICOLOSI (G.). — Contributo al **calcolo dei pilastri** di cemento armato comuni e cerchiati. (3 500 parole & fig.)

1931 621 .87 (.45)
L'Ingegnere, Maggio, p. 339.
GIUSTA (A. della). — Le nuove **grue a volata mobile** nel Porto di Genova. (2 500 parole & fig.)

1931 624 .2 & 721 .9
L'Ingegnere, Aprile, p. 349.
CACCINI. — Sulle **travi di cemento armato.** (2 000 parole & fig.)

Il Notiziario tecnico. (Firenze.)

1931 621 .135 .2
Il Notiziario tecnico, Giugno, p. 145.
Cause di allentamento dei cerchioni delle ruote di locomotive. (1 900 parole.)

1931 385 .113 (.45)
Il Notiziario tecnico, Giugno, p. 148.
Spese di esercizio e complementari delle Ferrovie dello Stato. (3 000 parole.)

Rivista delle Comunicazioni ferroviarie. (Roma.)

1931 656 .1 & 656 .2
Rivista delle Comunicazioni ferroviarie, Giugno, p. 22.
ARNAO (B.). — **Collaborazione tra ferrovia ed automobile.** (2 000 parole.)

Rivista tecnica delle ferrovie italiane (Roma.)

1931 621 .33 (.45)
Rivista tecnica delle ferrovie italiane, 15 Maggio, p. 205.
MONTANARI (C.). — **L'elettrificazione** della linea **Spezia-Livorno.** (3 800 parole & fig.).

1931 385 .114
Rivista tecnica delle ferrovie italiane, 15 Maggio, p. 217.
TOSTI (L.). — Il **costo unitario dei trasporti ferroviari.** (4 200 parole & fig.)

1931 621 .87 (.45)
Rivista tecnica delle ferrovie italiane, 15 Maggio, p. 226.
ZANNA (A. del). — **Gru a ponte scorrevole** da 10 tonnellate a strutture saldate elettricamente. (6 000 parole & fig.)

Trasporti terrestri. (Roma.)

1931 625 .245 (.73) & 656 .225 (.73)

Trasporti terrestri, Febbraio-Marzo, p. 10.

Tipi e impiego dei « **containers** » negli Stati Uniti. (1 800 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 691 (.492)

De Ingenieur, n° 21, 22 Mei, p. 136.

FRANX (C.). — Ontkisten, contrôleproeven en **cementkeuring** in verband met art. 18 der G. B. V. 1930. (3 400 woorden.)

1931 62 (01 & 691

De Ingenieure, n° 21, 22 Mei, p. 140.

STEVENS (O.). — Over de verhouding n = Ey : Eb. (3 000 woorden & fig.)

1931 656 .1 & 656 .8

De Ingenieur, n° 22, 29 Mei, p. 55.

VAN DEN BERCH VAN HEEMSTEDE (I. L.). — **Gecombineerd vervoer.** (9 700 woorden.)

1931 621 .138 .3 (.43)

De Ingenieur, n° 24, 12 Juni, p. 85.

Nieuwe inrichtingen en methoden voor het **onderzoek van de locomotieven** der Duitsche Rijsspoorwegen. (1 800 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1931 651 (.492)

Spoor- en Tramwegen, n° 11, 26 Mei, p. 275.

TEN SANDE (H. C.). — Het **ponskartensysteem** in de Administratie der Nederlandsche Spoorwegen. (3 000 woorden & fig.)

1931 656 .213 (.43)

Spoor- en Tramwegen, n° 12, 9 Juni, p. 313.

SIMON-THOMAS (W.). — Een modern **kolen-overslagbedrijf.** (1 900 woorden & fig.)

In Polish.

INŻYNIER KOLEJOWY. (Warszawa.)

1931 656 .232 (.438)

Inzynier Kolejowy, 1 Maja, str. 139.

SZTOLCMAN (S.). — Wyniki **badania kosztu przewozów** na polskich kolejach. (6 000 slowa, 19 tablice & rys.)

1931 656 .23 (.438)

Inzynier Kolejowy, 1 Czerwca, str. 171.

DOBRZYCKI (B.). — Badania **wydatków ruchu osobowego i towarowego** Kolei Paústwowych w Polsce za okres r. 1924-1928/1929. (2 400 slowa, 2 tablice & rys.)

1931 621 .138 .5 & 625 .

Inzynier Kolejowy, 1 Czerwca, str. 175.

POPLAWSKI (L.). — O plynnosci pracy przy n prawic parowozów i wagonów. (7 200 slowa & rys.)

1931 624 .7 (.43

Inzynier Kolejowy, 1 Czerwca, str. 182.

SWICTORZECKI (Z.). — Budowa **mostu kolejowe** przcz rzeke Widawke. (600 slowa & rys.)

In Portuguese.

Gazeta dos Caminhos de ferro. (Lisboa.)

1931 385. (093 (.469

Gazeta dos Caminhos de Ferro, n° 1042, 16 de Mai p. 192; n° 1043, 1 de Junho, p. 216.

TORRES (C. M.). — O **caminho de ferro** em Portugal. (3 200 palavras.) (Continua.)

In Rumanian.

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Revista C. F. R. (Bucuresti.)

1931 385 .113 (.498) = 59

Revista C. F. R., n° 1, p. 2.

RADUCANU. — Exposé sur le **budget de la régie au**tonome des Chemins de fer roumains pour l'exercic 1931. (3 600 mots.)

1931 621 .133 .5 = 59

Revista C. F. R., n° 1, p. 11.

VATAMANU. — Le **tirage des locomotives** et l différents modes d'échappement. (9 000 mots, diagr. fig.)

1931 656 .1 (.498) = 59

Revista C. F. R., n^{os} 2-3, p. 67.

VAUGHELESCU. — La **lutte entre le chemin de fe et les auto-camions** en Roumanie. (4 800 mots.)

1931 625 .1 (.438 + .498) = 59

Revista C. F. R., n^{os} 2-3, p. 75.

ADELSTEIN. — **La ligne de Vijnitza à Kuty,** nouvelle artère entre la Roumanie et la Pologne. (6 00 mots & fig.)

In Serbian.

(= 91.882)

Saobračajni Pregled. (Beograd.)

1930 656 .231 = 91 .88

Saobracajni Pregled, n° 1, p. 1.

TSOUGMOUS (CUGMUS). — Les **tarifs** de l'avenir (4 500 mots.)

1931 **387 (.4) = 91 .882**
Saobracajni Pregled, n° 1, p. 11.
JOSIMOVIC. — Entretien de **la navigabilité** du Danube en tant qu'obligation des Etats riverains. (2 700 mots.)

1931 **656 .232 = 91 .882**
Saobracajni Pregled, n° 1, p. 13.
NIKOLIC. — **Prix de revient dans l'exploitation** des chemins de fer. (1 800 mots.)

1931 **669 = 91 .882**
Saobracajni Pregled, n° 1, p. 26.
KOKAREV. — **Qualité mécanique** et l'analyse des métaux blancs. (1 800 mots & diagr.)

1931 **385 .21 = 91 .882**
Saobracajni Pregled, n° 1, p. 27.
LUCIDZ. — Court aperçu historique de la navigation intérieure. (1 400 mots.)

1931 **385 .587 = 91 .882**
Saobracajni Pregled, n° 1, p. 29.
LAZIC. — Efforts en vue de la **mécanisation du travail** dans les chemins de fer. (4 500 mots & fig.)

1931 **621 .132 (.497 .1) = 91 .882**
Saobracajni Pregled, n° 2, p. 37.
POPOVIC. — Les **nouvelles locomotives yougoslaves** à voie normale. (3 600 mots.)

1931 **656 .225 = 91 .882**
Saobracajni Pregled, n° 2, p. 47.
NIKOLIC. — Rentabilité des **trains légers de marchandises,** d'après les expériences en Tchécoslovaquie et surtout en Allemagne. (1 800 mots.)

1931 **016 .385 = 91 .882**
Saobracajni Pregled, n° 2, p. 48.
REPIC. — **Bibliographie de chemins de fer.** (5 000 mots.)

1931 **385 .2 = 91 .882**
Saobracajni Pregled, n° 2, p. 55.
KRMPCTIC. — **Importance des voies navigables.** (900 mots.)

1931 **385 .113 (.497 .1) = 91 .882**
Saobracajni Pregled, n° 2, p. 58.
Résumé des **résultats d'exploitation** et du rendement des chemins de fer yougoslaves. (10 000 mots et tableaux.)

1931 **625 .17 (.497 .1) = 91 .882**
Saobracajni Pregled, n° 2, p. 72.
BOCHKOVIC. — **Organisation du service de la voie** dans les Directions régionales des chemins de fer de l'Etat yougoslave. (2 700 mots.)

In Czech.
(= 91.886)

Železnični Revue. (Praha.)

1931 **385 (.73) = 91 .886**
Zeleznicni Revue, n° 2, p. 17.
PETRIVALSKY. — Les **chemins de fer** des **Etats-Unis d'Amérique** et le public. (2 100 mots & fig.)

1931 **656 .25 = 91 .886**
Zeleznicni Revue, n° 3, p. 33; n° 4, p. 51.
SVOBODA. — Quelques questions de la science **ayant** pour but de garantir la **sécurité de l'exploitation** de chemins de fer. (4 900 mots & fig.) (A suivre.)

Zprávy železničnich inženýrů. (Praha.)

1931 **625 .1 (.437) = 91 .886**
Zprávy zeleznicnich inzenyru, n° 1, p. 1.
RYBAK. — **Réalisation du chemin de fer** de Cervená Skála à Margecany, (tronçon le plus important de la nouvelle communication transversale en Slovaquie). (5 500 mots & fig.)

1931 **385 .11 (.437) = 91 .886**
Zprávy zeleznicnich inzenyru, n° 1, p. 21.
KOLLER. — Etude sur la question du **capital de premier établissement** des chemins de fer de l'Etat tchécoslovaque. (5 500 mots.) (A suivre.)

1931 **656 .253 = 91 .886**
Zprávy zeleznicnich inzenyru, n° 2, p. 21.
HALAVANJA. — Critique des systèmes de la **répétition des signaux** sur la locomotive. (5 500 mots.)

1931 **385 .52 (.73) = 91 .886**
Zprávy zeleznicnich inzenyru, n° 2, p. 40.
PETRIVALSKY. — **Traitements et salaires** du personnel des chemins de fer aux Etats-Unis de l'Amérique du Nord. (3 300 mots.)

1931 **625 .2 = 91 .886**
Zprávy zeleznicnich inzenyru, n° 2, p. 43.
PINKAVA. — **Architecture du matériel roulant des chemins de fer.** (2 200 mots.)

1931 **625 .233 = 91 .886**
Zprávy zeleznicnich inzenyru, n° 2, p. 44.
HOYER. — Joints de la courroie des **dynamos servant à l'éclairage des voitures.** (2 100 mots & fig.)

11.101. — Publisher : M. Weissenbruch Co., Ltd., Printer to the King, 49, rue du Poinçon, Brussels.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

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[016 .385 (02]

I. — BOOKS.

In French.

1931 347 .763
CKERMANN (Ch.)
Répertoire de jurisprudence en matière de transports.
Paris (5e). Librairie du Recueil Sirey, 22, rue Souf-ot. Un fort volume. (Prix: 100 francs.)

1931 347 .763.4 & 351
UBRY (Ch.).
Cours de législation des chemins de fer.
Paris. Ecole spéciale des Travaux Publics, rue du ommerard. Deux volumes (16 × 21). (Prix : francs.)

1931 656 .1 & 656 .2
ERTRAND (G.).
Le rail et la route.
ris (5e). Editions Domat-Montchrestien, rue Saint-cques. Un volume. (Prix : 50 francs.)

1931 385 (.44)
LANDIN (L.).
La Compagnie du Chemin de fer de Paris à Lyon et à Méditerranée et la mise en valeur de la Vallée du ône.
Paris (5e). Editions Domat-Montchrestien, rue Saint-cques. Un volume. (Prix : 30 francs.)

1931 621. (02
UILLOT (L.).
Cours de mécanique à l'usage des élèves des Ecoles tionales d'Arts et Métiers.
Paris (6e). Ch. Béranger, 15, rue des Saints-Pères. n volume, 490 pages, 311 figures. (Prix : 70 francs.)

1931 62. (09 & 69. (09
Les progrès réalisés depuis cent ans dans les tra-ux publics, 1831-1931. (Publication spéciale consacrée la célébration du Centenaire des Annales des Ponts Chaussées.
Paris (9e). A. Dumas, 5, rue Jules Lefebvre. Un vo-me, 376 pages et figures. (Prix : 30 francs.)

1931 62. (02 & 69. (02
MASSOTTE (E.).
Carnet des travaux publics et du bâtiment.
Paris (6e), Ch. Béranger, 15, rue des Saints-Pères. Un volume, 619 pages, 364 figures et 115 tableaux. (Prix : 120 francs.)

1931 385. (09 (.61)
POGGI (J.).
Les chemins de fer d'intérêt général de l'Algérie.
Paris (5e), 11, rue Victor-Cousin. Un volume, 590 pages, figures et cartes. (Prix : 85 francs.)

In German.

1931 621 .114
ASCHER (R.).
Die Schmiermittel, ihre Art, Prüfung und Verwendung.
Berlin, Verlag Julius Springer. 1 Band. (Preis : 16 R.M.)

1931 621 .33
BUCHHOLD (T.) und TRAMNIK (F.).
Die elektrischen Ausrüstungen der Gleichstrombahnen einschliesslich der Fahrleitungen.
Leipzig, Johann Ambrosius Barth, und Brüssel, Falk, Fils, rue des Paroissiens. 1 Band. 312 Seiten und 267 Textabbildungen. (Preis : 32 R.M.)

1931 624 .32 (.43 & 624 .62 (.43)
Deutsche Reichsbahn-Gesellschaft. Grundsätze für die bauliche Durchbildung stählerner Brücken.
Berlin, Wilhelm Ernst & Sohn. (Preis : 1.40 R.M.)

1931 62. (01
FÖPPL (O.).
Grundzüge der technischen Schwingungslehre.
Berlin, Julius Springer. 1 Band, 212 Seiten mit 140 Abbildungen. (Preis : 9.50 R.M.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly h the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by WEISSENBRUCH in the number for November, 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1931 621 .33 (.431)
REMY (K.):
Die Elektrisierung der Berliner Stadt-, Ring- und Vorortbahnen als Wirtschaftsproblem.
Leipzig, Johann Ambrosius Barth, und Brüssel Falk, Fils, rue des Paroissiens. 1 Band, 239 Seiten, 15 Abbildungen und 10 Tafeln.

1931 621 .116
STUMPER (R.)
Speisewasser und Speisewasserpflege im neuzeitlichen Dampfkraftbetrieb.
Berlin, Julius Springer. 1 Band, 171 Seiten mit 84 Abbildungen. (Preis : 9.60 R. M.)

1931 69. 02
ZILLICH (K.).
Statik für Baugewerkschulen.
Berlin (W. 8.), Wilhelm Ernst & Sohn, 1 Band, 72 Seiten, 160 Abbildungen. (Preis : 2.40 R.M.)

In English.

1931 016 (5 + 6)
A catalogue of British scientific and technical books.
Third edition. Compiled by Daphne Shaw for the British Science Guild.
London, A. & F. Denny, Ltd., 163, Strand, W. C. 2. (5 3/4 × 8 3/4 inches), 754 pages. (Price: 20 sh. net.)

1931 621 .43
ADAMS (O.).
Modern Diesel-engine practice.
New York, N. W. Henley Publishing C°. 1 volume (6 × 10 inches), 656 pages, illustrations, diagrams, tables. (Price : $ 6.)

1931 625 .142.2 (06 (.73) & 69 (06 (.73)
American Wood-Preservers' Association Proceedings of the twenty-seventh annual meeting, 1931.
Philadelphia (Pennsylvania). 1 volume, 454 pages & figures.

1931 621 .116 (03
BASSETT (H. N.).
Chemical technology of steam-raising plant.
London & New York, Longmans, Green & Co. 1 volume (6 × 9 inches), 240 pages, diagrams, charts, tables. (Price : $ 5.)

1931 016 (621 (06 (.42)
INSTITUTION OF MECHANICAL ENGINEERS, LONDON.
Brief subject-index of papers published in the proceedings 1847-December 1930. 1 volume, 95 pages.

1931 669
CAMPBELL (W.).
List of alloys, with physical properties of typical alloys.
Philadelphia, American Society for Testing Materials. 1 volume (6 × 9 inches), 65 pages. (Price : $ 1.50.)

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GOLDINGHAM (A. H.)
High-speed Diesel engines.
London, E. & F. Spon, Ltd. 1 volume (6 × 9 inches) 148 pages, illustrations, diagrams, charts, tables. (Price 10 sh. 6 d.)

1931 625 .14 (.71 + .73
HARVEY (A. F.).
Report on track practice on American and Canadian Railways.
Calcutta, Railway Board, East Indian Railway Press 1 pamphlet, 23 pages.

1931 62. (01 & 669
JOHNSTONE (Henry Fraser).
The corrosion of power plant equipment by flue gases.
Urbana, (U. S. A.), University of Illinois. 1 volume 122 pages & figures.

1931 693 (02
KUHL (H.).
London, Cement chemistry in theory and practice. Christelow, J. W., Concrete Publications, Ltd. 1 volume (6 × 9 inches) 64 pages & illustrations. (Price: 7 sh. 6 d. net.)

1931 656 .25. (06 (.73)
SIGNAL SECTION, AMERICAN RAILWAY ASSOCIATION.
Minutes thirty-seventh annual meeting, New York, N. Y., May 12 and 13, 1931.
New York (N. Y.), Signal Section, A. R. A., Vesey Street. 1 volume, 605 pages.

1931 621 .13 (02)
Society of Automotive Engineers handbook.
New York. Published by the society. 1 volume (4 × 8 inches), 752 pages, diagrams, charts, tables. (Price : $ 5.)

1931 669 (06
The chemical composition and physical properties of heat resisting alloys.
Philadelphia, Pa., American Society for Testing Materials, 1315 Spruce street. 1 vol. (6 × 9 inches), 11 tables.

1931 385. (02 (.42)
The Railway Year Book for 1931.
London (S. W. 1.). The Railway Publishing Company Ltd., 33, Tothill street, Westminster. 1 volume (5 1/2 × 8 3/4 inches), 377 pages, 19 maps. (Price : 5 sh.)

1931 385. (02
The Universal Directory of Railway Officials 1931.
London (S. W. 1.) The Directory Publishing Co. Ltd., 33, Tothill street, Westminster. 1 volume (5 1/2 × 8 1/2 inches), 384 pages. (Price : 20 sh.)

1931 621 .33 & 621 .4

Underground electric systems. Underground systems reference book.

New York, National Electric Light Association, 420, Lexington Ave. 1 volume (9 × 12 cm.), 377 pages & illustrations. (Price : $ 6.)

1931 624 .63

YU (H.).

Reinforced-concrete multiple arch bridge on elastic piers.

Hsin Hwa Chich (China), 5a, Si-Siao Shaun-a-Chuang, North End of Pei. One pamphlet (6 × 9 inches) of 39 pages; (line cuts).

[016 .385. (05]

II. — PERIODICALS.

In French.

Arts et Métiers. (Paris.)

1931 691

Arts et Métiers, juin, p. 202.

MARCOTTE (E.). — L'avenir du **béton armé.** (11 000 mots.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1931 385 .517.6 (.44)

Bull. de la Sté d'encourag. pr l'ind. nation., avril, p. 205.

SAUVAGE (E.). — Equipage mobile de **radiologie** de la Compagnie du Chemin de fer du Nord. (900 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1931 621 .33 (.44)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 75.

BACHELLERY. — **L'électrification** des chemins de fer du Midi. (7 000 mots.)

1931 621 .33 (.44)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 87.

PARODI. — **Electrification** de la Compagnie du chemin de fer d'Orléans. (8 500 mots.)

1931 621 .33 (.44)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 104.

JAPIOT. — **L'Electrification** de la ligne de Modane (P. L. M.). (7 500 mots.)

1931 621 .33 (.44)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 123.

LÉVY (J.). — **Electrification** des lignes de banlieue du réseau de l'Etat. (9 500 mots & fig.)

1931 621 .33 (.44)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 146.

BACHELLERY. — Etat actuel de **l'électrification** sur les Grands Réseaux de chemins de fer français. (7 500 mots.)

1931 621 .33 (.492)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 162.

VAN LESSEN. — **L'électrification** de quelques lignes du réseau des chemins de fer néerlandais. (6 000 mots & fig.)

1931 621 .33 (.494)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 181.

HUBER-STOCKAR. — **L'électrification** des Chemins de fer Fédéraux de Suisse. (11 000 mots & fig.)

1931 621 .33 (.43)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 208.

MICHEL (O.). — Le développement de la **traction électrique** sur les chemins de fer allemands. (5 500 mots.)

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Bull. de la Soc. des ing. civ. de France, janvier-février, p. 220.

BIANCHI. — Etat actuel de **l'électrification** des chemins de fer en Italie. (11 500 mots, 4 tableaux & fig.)

1931 621 .33 (.42)

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 256.

SMITH (R. T.). — L'état actuel de **l'électrification** des chemins de fer en Grande-Bretagne. (5 500 mots.)

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Bull. de la Soc. des ing. civ. de France, janvier-février, p. 269.

BACQUEYRISSE. — L'emploi des **moteurs Compound en traction électrique** par courant continu et la récupération d'énergie. (25 000 mots & fig.)

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Bull. de la Soc. des ing. civ. de France, mars-avril, p. 478.

TETTELIN (F.). — La **substitution des voies principales.** (7 500 mots & fig.)

1931 721 .9

Bull. de la Soc. des ing. civ. de France, mars-avril, p. 494.

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Bull. de la Soc. des ing. civ. de France, mars-avril, p. 543.

PARODI (H.). — **Electrification** des chemins de fer suédois. (9 000 mots & fig.)

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Bull. de la Soc. des ing. civ. de France, mars-avril, p. 569.

PARODI (H.). — **Electrification** des Chemins de fer norvégiens. (3 000 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1931 385. (09 (.61 + .64)
Bull. de l'Union intern. des ch. de fer, février-mars, p. 35.

Les **chemins de fer** de l'Afrique du Nord française. (12 000 mots & fig.)

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Bull. de l'Union intern. des ch. de fer, février-mars, p. 52.

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Les **chemins de fer du monde** en 1928. (2 200 mots.)

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Bull. de l'Union intern. des ch. de fer, février-mars, p. 70.

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Bull. de l'Union intern. des ch. de fer, février-mars, p. 89.

SHERRINGTON (C. E. R.). — Les **quatre grandes Compagnies de chemins de fer** de Grande-Bretagne pendant les exercices de 1923 à 1930. (14 000 mots & 48 tableaux.)

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Bull. de l'Union intern. des ch. de fer, février-mars, p. 117.

Les **Chemins de fer roumains.** (11 000 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1931 656 .2
Bull. des transp. intern. par ch. de fer, juin, p. 325.

MALTESE (S.). — La **négociabilité des documents de transport** par chemins de fer. (2 400 mots.)

1931 313 .385 (.439
Bull. des transp. intern. par ch. de fer, juin, p. 359

Statistique des Chemins de fer royaux de l'Etat hongrois pour l'exercice 1929-1930. (700 mots.)

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Bulletin des transp. intern. par ch. de fer, juillet, p. 370

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Bull. des transp intern. par ch. de fer, juillet, p. 407

Résultats de l'exploitation des chemins de fer bulgares à voie normale durant les exercices de 1927-28 1928-29 et 1929-30. (1 300 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1931 725 .31 (.494)
Bull. techn. de la Suisse romande, n° 14, 11 juill., p. 174

KOHLER (A.). — La **gare** de Comavin, à Genève. (1 800 mots.)

Bulletin technique de l'Union professionnelle des inspecteurs techniques et des chefs de section des chemins de fer belges. (Bruxelles.)

1931 621 .135.2 & 625 .212
Bull. tech. Union prof. Inspecteurs techn. et Chefs de section des Ch. de fer belges, 15 juin, p. 6.

JONIAUX. — Quelques considérations sur l'**usure des boudins des roues** des véhicules et sur l'influence de ce phénomène sur l'usure latérale des rails dans la file extérieure des voies en courbe de faible rayon. (400 mots & fig.)

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Bull. tech. Union prof. Inspecteurs techn. et Chefs de section des Ch. de fer belges, 15 juin, p. 8.

WYFFELS. — Les appareils pour le **graissage des boudins des roues** des locomotives. (600 mots & fig.)

Chronique des transports. (Paris.)

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Chronique des Transports, 25 juin, p. 5.

La **situation** des chemins de fer et l'inflation des dépenses publiques. (2 800 mots.)

1931 385 .113 (.44)
Chronique des Transports, 25 juin, p. 10.

Les **résultats de l'exploitation** de la Compagnie du chemin de fer du Nord en 1930. (3 000 mots.)

Génie civil. (Paris.)

1931 62. (01
Génie civil, n° 2549, 20 juin, p. 615.

TESAR (V.). — Représentation simple et complète en grandeur et en direction, des efforts intérieurs dans les **problèmes d'élasticité plane.** (4 800 mots & fig.)

1931 621 .87 (.44)
Génie civil, n° 2550, 27 juin, p. 636.
CAUFOURIER (P.). — **Grues flottantes Diesel-électriques** du port de Dunkerque. (5 000 mots & fig.)

1931 621 .31 (06
Génie civil, n° 2550, 27 juin, p. 643.
Le Congrès du Syndicat des Producteurs et Distributeurs **d'énergie électrique.** (Alger, 21-25 avril 1931). (3 000 mots & fig.)

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Génie civil, n° 2550, 27 juin, p. 646.
CHAUDY (F.). — Les **arcs sans poussée.** (800 mots & fig.)

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Génie civil, n° 2552, 11 juillet, p. 46.
La **détermination du rapport** $n = \frac{Ef}{E_0}$ dans le béton armé. (800 mots & fig.)

1931 621 .33 (.45
Génie civil, n° 2552, 11 juillet, p. 48.
Sous-stations mobiles de redresseurs à vapeur de mercure, pour les Chemins de fer de l'Etat italien. (900 mots & fig.)

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Génie civil, n° 2552, 11 juillet, p. 49.
Le **rayonnement de la grille** dans les chaudières à vapeur multitubulaires. (900 mots.)

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Génie civil, n° 2553, 18 juillet, p. 63.
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Génie civil, n° 2553, 18 juillet, p. 73.
Recherches sur les composés fer-carbone-aluminium. (700 mots.)

1931 669 .1
Génie civil, n° 2554, 25 juillet, p. 97.
Le rôle du nickel dans les **aciers de cémentation.** (800 mots & fig.)

La Science et la Vie. (Paris.)

1931 624 .5 (.73)
La Science et la Vie, juillet, p. 43
BODET (J.). — Le plus grand **pont suspendu** du monde va être mis en service entre New-York et New-Jersey. (3 500 mots & fig.)

1931 656 .251 (.44)
La Science et la Vie, août, p. 111.
MARCHAND (J.). — Voici la nouvelle **signalisation** des chemins de fer français. (2 000 mots & fig.)

La Traction électrique. (Paris.)

1931 621 .33 (.460)
La Traction Electrique, mai, p. 129.
GIBERT y SALINAS (A.). — **Continu ou monophasé ?** Du choix du système de courant le mieux approprié pour l'électrification des chemins de fer espagnols. (6 600 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1931 621 .132.8 : 621 .165
Les chemins de fer et les tramways, juin, p. 107.
Locomotives à turbines Krupp-Zoelly. (4 500 mots & fig.)

1931 621 .132.5 (.73)
Les chemins de fer et les tramways, juin, p. 110.
Locomotive Baldwin 1-5-2 de l'Atchison, Topeka and Santa-Fé Railway. (2 400 mots & fig.)

1931 621 .132.7 (.82 & 621 .42 (.82)
Les chemins de fer et les tramways, juin, p. 112.
Locomotive Diesel de manœuvre du réseau central de l'Argentine. (2 000 mots & fig.)

1931 621 .138.2
Les chemins de fer et les tramways, juin, p. 114.
DUCHESNOY. — Le **chargement mécanique** du charbon dans les tenders de locomotives. (1 800 mots.)

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Les chemins de fer et les tramways, juin, p. 117.
Appareil servant à arrondir les angles des planches équarries et palettes de marchepieds de wagons. (2 000 mots & fig.)

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Les chemins de fer et les tramways, juin, p. 118.
Wagon raboteur. (400 mots & fig.)

1931 625 .246
Les chemins de fer et les tramways, juin, p. 119.
Dispositif de **toiture à volets rabattables,** destiné à des wagons à marchandises. (900 mots & fig.)

1931 625 .212
Les chemins de fer et les tramways, juin, p. 120.
Dispositif pour rafraîchir et calibrer les **bandages des véhicules** sur la voie. (900 mots & fig.)

1931 625 .144.4
Les chemins de fer et les tramways, juin, p. 120.
Machines à déplacer les voies. (1 800 mots & fig.)

1931 621 .132.8
Les chemins de fer et les tramways, juin, p. 123.
Perfectionnement aux **locomotives articulées.** (800 mots & fig.)

1931 625 .258
Les chemins de fer et les tramways, juin, p. 124.
Frein à sabot d'enrayage réglable. (500 mots & fig.)

1931 621 .133.5

Les chemins de fer et les tramways, juin, p. 125.

Régulateur de tirage pour locomotives. (500 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1931 621 .333

L'Ind. voies ferrées et transp. autom., mai, p. 151.

RICCIA (D.). — Procédé rationnel pour l'étude complète des caractéristiques du **moteur de traction à courant continu** et quelques remarques d'actualité. (Suite et fin.) (6 600 mots & fig.)

1931 621 .333

L'Ind. voies ferrées et transp. autom., mai, p. 161.

BACQUEYRISSE. — A propos de l'emploi des moteurs compound en **traction électrique** par courant continu. (4 000 mots.)

1931 625 .151 (.44)

L'Ind. voies ferrées et transp. autom., mai, p. 163.

GERARD (J.). — Note sur un **aiguillage Vignole** à lame en acier au manganèse et contrerail-support en acier coulé. (500 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1931 656 .211 (.44)

Revue générale des chemins de fer, juillet, p. 3.

LEVI (R.). — Récents **travaux exécutés à la gare** Saint-Lazare et à ses accès. (Suite.) (6 700 mots & fig.)

1931 621 .132 (.44) & 621 .134 (.44)

Revue générale des chemins de fer, juillet, p. 18.

CHAPELON (A.). — **Transformation des locomotives Pacific Compound** à grande vitesse, séries 3501 à 3589, de la Compagnie d'Orléans. (22 400 mots, 7 tableaux & fig.)

1931 385. (09.1 (.64)

Revue générale des chemins de fer, juillet, p. 76.

Les **chemins de fer** au Maroc. (6 400 mots & fig.)

Revue universelle des transports et des communications. (Paris.)

1931 625 .5 (.494)

Revue univers. des transp. et des communications, n° 112, p. 127.

ZEHNDER (R.). — Augmentation de la **vitesse de marche** des trains du chemin de fer funiculaire Sierre-Montana-Vermala-Crans. (1 200 mots & fig.)

1931 625 .4 (.438)

Revue univers. des transp. et des communications, n° 112, p. 135.

KUBALSKI (J.). — Le projet des **Chemins de fer métropolitains** de Varsovie. (3 500 mots & fig.)

In German.

Allgemeiner Tarif-Anzeiger. (Wien.)

1931 656 .225 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 5, S. 142; Nr. 6, S. 174.

SCHWEINBURG. — Die « allgemeinen Geschäftsbedingungen im **Speditions Gewerbe** » A. C. B. S. P. (1 Seite.)

1931 656 (.47)

Allgemeiner Tarif-Anzeiger, Nr. 7, S. 210.

LORENZ. — Das **Beförderungsproblem** in der Sowjetunion. (1 Seite.)

1931 656 .23 (0 (.4)

Allgemeiner Tarif-Anzeiger, Nr. 13, S. 409.

Zollpolitische Angleichung und **Eisenbahn-Tarifpolitik** in Europa. (1 Seite.)

1931 656 .261

Allgemeiner Tarif-Anzeiger, Nr. 14, S. 441.

Einführung eines « **Haus-Haus-Verkehres** » in Österreich beschlossen. (1 1/2 Seite.)

1931 656 .1 (.436) & 656 .2 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 14, S. 443.

Verständigung zwischen Bundesbahnen und Kraftwerken im Wickner **Nahverkehr**. (1/2 Seite.)

1931 656 .261 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 15, S. 478; Nr. 16, S. 510.

Zur Einführung des **Haus-Haus-Verkehres** in Österreich. (4 Seiten.)

1931 347 .763

Allgemeiner Tarif-Anzeiger, Nr. 15, S. 486.

MATHIAS. — **Verkehrsrecht**. — Zur Vorbereitung der Revision des I. U. G. (2 Seiten.)

1931 656 .261 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 17, S. 546.

Der **Haus-Haus-Verkehr** in Österreich. Der Haus-Haus-Tarif. (3/4 Seite.)

1931 656 .1 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 20, S. 642.

FREUD. — Der Konzessionszwang für den **Autofrachtenverkehr**. (1/2 Seite.)

1931 656 .235 (.44 (.436)

Allgemeiner Tarif-Anzeiger, Nr. 20, S. 643.

Stand der **Gütertarife** in den europäischen Staaten. 1. Reihe : Österreich. (2 Seiten).

1931 656 .231 (.43)

Allgemeiner Tarif-Anzeiger, Nr. 21, S. 677.

Die **Tarifermässigungspläne** der Deutschen Reichsbahn. (1/2 Seite.)

Archiv für Eisenbahnwesen. (Berlin.)

1930 **656 .23 (0**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1497.
SPIESS (W.). — **Tarif, eine enzyklopädische Studie.** [(]Schluss.) (7 800 Wörter.)

1930 **313 .385 (.489)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1599.
Die **Eisenbahnen in Dänemark** in den Betriebsjah[r]en 1927-28 und 1928-29. (1 500 Wörter.)

1930 **313 .385 (.481)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1611.
Die **Eisenbahnen in Norwegen** in den Jahren 1927-28 [u]nd 1928-29. (3 000 Wörter.)

1930 **313 .385 (.97.5)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1624.
ROESNER (E.). — Die **Staatsbahnen in Litauen** im [J]ahr 1928. (2 000 Wörter.)

1930 **313 .385 (.47.43)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1632.
Die **Lettländischen Eisenbahnen** im Wirtschaftsjahr [1]928-29. (3 000 Wörter.)

1930 **313 .385 (.41.5)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1649.
Die **Eisenbahnen Irlands** 1927 und 1928. (3 000 Wörter.)

1930 **313 .385 (.498)**
[A]rchiv für Eisenbahnwesen, Heft 6, Nov.-Dez., S. 1662.
Die **Rumänischen Staatsbahnen** in den Jahren 1927 [u]nd 1928. (2 500 Wörter.)

1931 **385. (09.1 (.68)**
[A]rchiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 571.
DIECKMANN. — Die **Eisenbahnen und Häfen** in der [S]üdafrikanischen Union. (10 000 Wörter.)

1931 **385 .113 (.492)**
[A]rchiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 605.
OVERMANN. — Die **Niederländischen Eisenbahnen** [i]m Jahr 1929. (6 000 Wörter.)

1931 **385 .113 (.92)**
[A]rchiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 619.
Die **Eisenbahnen in Niederländisch-Ostindien** in den [J]ahren 1928 und 1929. (6 000 Wörter.)

1931 **385 .113 (.493)**
[A]rchiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 667.
Die nationale Gesellschaft der belgischen Eisenbahnen [i]m dritten Geschäftsjahr (1. Januar bis 31. Dezember [1]929) dargestellt auf Grund des Geschäftsberichts der [G]esellschaft und des Berichts des Verwaltungsrats. [(]3 000 Wörter.)

1931 **385 .113 (.45)**
[A]rchiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 689.
Die **italienischen Staatsbahnen** im Rechnungsjahr [1]928-29. (6 500 Wörter.)

1931 **385 .113 (.675)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 715.
Die **Verkehrsmittel** und ihre Ergebnisse in Belgisch-Kongo in den Jahren 1923-1928. (3 200 Wörter.)

1931 **621 .33 (.431) & 388 (.431)**
Archiv für Eisenbahnwesen, Beiheft zu Heft 3, Mai-Juni, S. 1.
REMY. — Die **Elektrisierung** der Berliner Stadt-, Ring- und Vorortbahnen als Wirtschaftsproblem. (90 000 Wörter & Abb.)

Die Lokomotive. (Wien.)

1931 **621 .137.1 (.431)**
Die Lokomotive, Januar, S. 1.
BLUEMKE (F.).— Die **mechanische Rostbeschickung** auf Lokomotiven und ihre Anwendung auf der polnischen Staatsbahn. (2 800 Wörter & Abb.)

1931 **621 .43 (.43)**
Die Lokomotive, Februar, S. 21.
Diesel-Druckluft-Lokomotive der Deutschen Reichsbahn-Gesellschaft. (1 000 Wörter & Abb.)

1931 **621 .133.1**
Die Lokomotive, Februar, S. 32.
WIESSNER (P.). — **Behandlung des Kesselspeisewassers** ohne Vorreinigungsanlagen. (1 000 Wörter.)

1931 **625 .253 (.437)**
Die Lokomotive, April, S. 57.
KUDMA (J.). — Vorbereitungen der tschechoslowakischen Staatseisenbahn zur **Einführung der durchgehenden Güterzugsbremse.** (14 900 Wörter.)

Elektrische Bahnen. (Berlin.)

1931 **621 .332 (.43)**
Elektrische Bahnen, Juniheft, S. 167.
FISCHER (F.). — Richtlinien für den Entwurf von **Fahrleitungsanlagen** für **Wechselstrom-Vollbahnen.** (4 000 Wörter & Abb.)

1931 **621 .335 (.45)**
Elektrische Bahnen, Juniheft, S. 176.
SACHS (K.). — Neuere **Gleichstromlokomotiven** der Italienischen Staatsbahnen. (Schluss.) (700 Wörter & Abb.)

1931 **621 .335**
Elektrische Bahnen, Juniheft, S. 181.
SPIES (R.). — **Mechanisch-pneumatische Steuerungen** für mit Einphasen-Wechselstrom betriebene Vollbahnlokomotiven. (6 000 Wörter & Abb.)

1931 **621 .331 (.481)**
Elektrische Bahnen, Juniheft, S. 189.
KNUDTZON. — Neues **Bahnkraftwerk** für die norwegischen Staatsbahnen. (600 Wörter.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 **625 .62' (.43)**
Elektrotechnische Zeitschrift, Helf 25, 21.-23. Juni, S. 827.

MERTENS (F.). — **Quecksilberdampf-Grossgleichrichter** für Strassenbahnbetrieb in Frankfurt a. M. (2 300 Wörter & Abb.)

1931 **621 .33 (.433)**
Elektrotechnische Zeitschrift, Heft 26, 25. Juni, S. 846.

Eröffnung der elektrischen Bahnstrecke München-Augsburg. (7 000 Wörter & Abb.)

1931 **621 .33 (.495) & 625 .4 (.495)**
Elektrotechnische Zeitschrift, Heft 28, 9. Juli, S. 891.

Die **elektrische Untergrundbahn** in Athen. (900 Wörter & Abb.)

1931 **621 .392**
Elektrotechnische Zeitschrift, Heft 28, 9. Juli, S. 903.

KNILL (F.). — **Schalt- und Schweissoszillogramme** von Rosenberg-Querfelddynamos mit Regelpolen. (4 200 Wörter & Abb.)

1931 **621 .392**
Elektrotechnische Zeitschrift, Heft 29, 16. Juni, S. 932.

FRITZ (J. C.). — **Gleichstrom-, Einphasenstrom-oder Drehstrom-**Lichtbogenschweissung ? (3 000 Wörter.)

Glasers Annalen. (Berlin.)

1931 **385 .113 (.43)**
Glasers Annalen, Heft 1, 1. Juli, S. 1.

Aus dem **Geschäftsbericht** der Deutschen Reichsbahn-Gesellschaft über das 6. Geschäftsjahr. (1. Januar bis 31. Dezember 1930.) (6 500 Wörter & Abb.)

1931 **621 .133.3**
Glasers Annalen, Heft 1, 1. Juli, S. 6.

SCHRÖDER (O.). — **Untersuchung über Rissbildung** bei kupfernen Feuerbüchsen. (1 400 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1931 **621 .13 (.52)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 12, 15. Juni, S. 265.

PUTZE (O.). — Die **Betriebsmittel** und ihre Entwicklung bei der Japanischen Staatsbahn. (5 500 Wörter & Abb.)

1931 **625 .13 (.52)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 12, 15. Juni, S. 273.

MÜLLER. — Über den Bau des **Atami-Tunnels** (Japan). (4 000 Wörter & Abb.)

1931 **625 .18 (.436)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 12, 15. Juni, S. 278.

HROMATKA (F.). — **Stoffwirtschaft im Bahnerhaltungsdienste** der Osterreichischen Bundesbahnen. (2 200 Wörter & Abb.)

1931 **656 .212.5**
Organ für die Fortschritte des Eisenbahnwesens, Heft 13, 1. Juli, S. 283.

AMMANN (O.). — **Rangiertechnik.** (Schluss.) (7 000 Wörter & Abb.)

1931 **62. (01**
Organ für die Fortschritte des Eisenbahnwesens, Heft 13, 1. Juli, S. 292.

Von GRUENEWALDT. — Angenäherte Berechnung der **Knicksicherheit** eines gekrümmten lückenlosen Gleises. (3 000 Wörter & Abb.)

1931 **625 .143.4**
Organ für die Fortschritte des Eisenbahnwesens, Heft 13, 1. Juli, S. 295.

Wärmebehandlung von Schienenstössen zur Verhinderung der plastischen Verformung der Schienenköpfe im Betrieb. (1 000 Wörter & Abb.)

1931 **621 .133.3**
Organ für die Fortschritte des Eisenbahnwesens, Heft 14, 15. Juli, S. 299.

BÖHN (F.). — **Einwirkung des Kesselsteins** auf den **Wirkungsgrad** des **Lokomotivkessels.** (2 000 Wörter & Abb.)

1931 **621 .133.1**
Organ für die Fortschritte des Eisenbahnwesens, Heft 14, 15. Juli, S. 303.

KOESSLER (P.). — Die Flammenstrahlung in der **Lokomotivfeuerung.** (8 500 Wörter & Abb.)

1931 **621 .135.1 & 621 .135.2**
Organ für die Fortschritte des Eisenbahnwesens, Heft 14, 15. Juli, S. 312.

SCHNEIDER (J.). — Bearbeitung von **Pass- und Führungsflächen** an Lokomotivteilen. (2 000 Wörter & Abb.)

Reichsbahn (Berlin.)

1931 **385 .113 (.43)**
Reichsbahn, Nr. 1, S. 2.

Die **Deutsche Reichsbahn** im Jahre 1930. (29 Seiten.)

1931 **656 .212.5**
Reichsbahn, Nr. 10, S. 244.

VAN BIEMA. — Die **Entwicklung des Rangierfunks** und seine Anwendungsmöglichkeiten im Betrieb. (3 1/2 Seiten.)

1931 **625 .156**
Reichsbahn, Nr. 11, S. 264.

MÜLLER. — Feste oder bewegliche **Prellböcke** ? (1 Seite.)

1931 **625 .23**
Reichsbahn, Nr. 11, S. 265.

DIETRICH & SCHUBERT. — Wirtschaftliche **Personenwagenunterhaltung.** (1 Seite.)

1931 **656 .222 .3**
Reichsbahn, Nr. 11, S. 268.

Kennzeichnung der Reihenfolge der Wagen und Wagenklassen in den Reisezügen. (3 Seiten & Abb.)

1931 656 .224 (.43) & 654 (.43)
eichsbahn, Nr. 12, S. 299.
Zustellung von Privattelegrammen an Reisende und nnahme von Privattelegrammen von Reisenden in den ügen.

1931 625 .24 (0
eichsbahn, Nr. 13, S. 310.
KOMMERELL. — **Lademassüberschreitungen.** (5 Seiten & Zeichn.)

1931 625 .232 (.43)
eichsbahn, Nr. 13, S. 318.
Vierachsige Durchgangswagen für Eil- und Personenüge. (3 Seiten & Abb.)

1931 385. (09 (.43)
eichsbahn. Nr. 14, S. 340.
Die **Deutsche Reichsbahn-Gesellschaft, ihr Aufbau** und ır Wirken. (Rezension des Werkes von Dr. Sarter und r. Kittel.) (7 Seiten.)

1931 656 .23 (0
eichsbahn, Nr. 15, S. 354.
TECKLENBURG. — Die **Bedeutung der Selbstkostenechnung** für die Tarifbildung. (3 1/2 Seiten.)

1931 693 & 721 .9
eichsbahn, Nr. 15, S. 358.
SCHRÖDER. — Kosten **des Schutzes für Stahlbauerke.** (9 Seiten.)

1931 656 .211.7 (.43)
eichsbahn Nr. 17, S. 398.
VAN HEES. — Die **Schiffsbetriebe** der Deutschen eichsbahn. (10 Seiten & Abb.)

1931 656 .257
eichsbahn, Nr. 18, S. 429.
HOOGEN. — **Indulor** (Induktive Einrichtung Lorenz). Ein neues Betriebsmodell auf dem Gebiete der **Signalbertragung.** (4 Seiten & Abb.)

1931 625 .172 (.43)
eichsbahn, Nr. 20, S. 478; Nr. 21, S. 499.
ZINSSER (H.). — Der **Oberbaumesswagen** der Deutschen Reichsbahn. (16 Seiten & Abb.)

Verkehrstechnische Woche. (Berlin.)

1931 656 .212.4 (06 (.43)
Verkehrstechnische Woche. Nr. 8, S. 88.
ZOCHE. — Studiengesellschaft für **Rangiertechnik.** Berichte der Sonderausschüsse. Sonderausschuss 1 : **Rangiertechnische Einrichtungen.** (2 Seiten.)

1931 656 .212.4 (06 (.42)
Verkehrstechnische Woche. Nr. 8, S. 90.
CAUER. — Studiengesellschaft für **Rangiertechnik.** Berichte der Sonderausschüsse. Sonderausschuss 2 : **Profilgestaltung.** (1 Seite.)

1931 656 .212.4 (06 (.43)
Verkehrstechnische Woche, Nr. 8, S. 91.
WAGNER. — Studiengesellschaft für **Rangiertechnik.** Berichte der Sonderausschüsse. Sonderausschuss 3 : **Weichenbedienung, Verständigungsmittel, Beleuchtung.** (1 Seite.)

1931 656 .213
Verkehrstechnische Woche, Nr. 8, S. 93.
BLUM. — Der Vereinigte **Hafen- und Rangierbahnhof.** (3 Seiten.)

1931 656 .212.5
Verkehrstechnische Woche, Nr. 8, S. 95.
JORDAN & GOTTSCHALK. — Rechnerisches Verfahren für die Untersuchung von **Ablaufanlagen.** (7 Seiten & Zeichn.)

1931 656 .212.5
Verkehrstechnische Woche. Nr. 8, S. 103.
AMMANN & RAAB. — Inanspruchnahme der Weichen in der **Verteilungszone einer Ordnungsgruppe** durch Befahrung, Umstellungen und Trennungen. (6 Seiten & Zeichn.)

1931 656 .212.5
Verkehrstechnische Woche, Nr. 8, S. 109.
MÜLLER. — Die **Gestaltung des Zulaufprofils** auf Verschiebebahnhöfen. (7 Seiten & Zeichn.)

1931 656 .253
Verkehrstechnische Woche, Nr. 8, S. 117.
APEL. — Über neuzeitliche **Rangiersignalanlagen.** (4 Seiten.)

1931 625 .258
Verkehrstechnische Woche, Nr. 8, S. 126.
GOTTSCHALK. — Versuche mit **Hemmschuhen.** (6 Seiten, Zeichn. & Abb.)

1931 656 1. (.43) & 656 2. (.43)
Verkehrstechnische Woche, Nr. 9, S. 136.
Verkehrsmittel untereinander zur Frage Eisenbahn und Kraftwagen. Kundgebungen : Verband Deutscher Verkehrsverwaltungen (Juli 1930); Deutscher Industrie- und Handelstag (November 1930); Deutscher Landwirtschaftsrat, Denkschrift des Reichsministers für Finanzen (Dezember 1930); Spitzenverbände des Kraftfahrwesens; Allgemeine Deutsche Automobil-Clubs, Information über den Vertrag der Deutschen Reichsbahnspedition (Schenker & Co). (7 Seiten.)

1931 656 .27
Verkehrstechnische Woche, Nr. 10, S. 145.
SARTER. — **Verbilligungen im Betriebe von Nebenbahnen.**

Übersicht :

I. — Die Bedeutung der Nebenbahnen und ihre Rentabilität.

II. — Grundsätzliches über die Herabminderung der Kosten des Nebenbahnbetriebes.

III. — Die Preisgabe von Nebenbahnlinien zur Herabminderung der Gesamtkosten.

IV. — Die Betriebs- und Verkehrsvereinfachungen auf den bestehenden Nebenbahnen. Grundsätzliches. — Der Betriebsdienst. — Der Verkehrsdienst. — Die übrigen Dienstzweige. — Der Umfang des vereinfachten Nebenbahnbetriebes. — Die finanziellen Auswirkungen. — Personelle Fragen. — Organisatorische Auswirkungen.

V. — Zusammenfassung und Ausblick. (8 Seiten.)

1931 656 .1 (.73) & 656 .2 (.73)
Verkehrstechnische Woche, Nr. 10, S. 153.

SOMMER. — Die amerikanischen Eisenbahnen zur **Kraftwagenfrage.** Fortschritte in der Verkehrswirtschaft der Vereinigten Staaten. (1 1/2 Seite.)

1931 656 .1 & 656 .2
Verkehrstechnische Woche, Nr. 11, S. 157.

BAUMANN. — **Autobus für Strasse und Schiene.** (3 1/2 Seiten.)

1931 385
Verkehrstechnische Woche, Nr. 12, S. 169.

BINDEWALD. — Sind die **Eisenbahnen** auch heute noch berufen, jeden Verkehr zu bedienen ? (4 Seiten.)

1931 625 .258 & 656 .212.5
Verkehrstechnische Woche, Nr. 12, S. 173; Nr. 13, S. 185.

FRÖLICH. — Beilaufen und Beidrücken der Wagen in den Sammelgleisen der **Ablaufanlagen.** (8 1/2 Seiten & Abb.)

1931 651
Verkehrstechnische Woche, Nr. 13, S. 181.

KRINNER. — Fliessarbeit und aufendes Band im **Postbetrieb.** (3 1/2 Seiten.)

1931 656 .25 (.42)
Verkehrstechnische Woche, Nr. 14, S. 193.

REULEAUX. — Neue **Signal- und Sicherungsanlagen** der Südbahn in London-Nutzanwendung. (4 1/2 Seiten & Abb.)

1931 621 .132.8
Verkehrstechnische Woche, Nr. 14, S. 199.

HOFFMANN. — **Leichte Triebwagen.** (1 Seite.)

1931 656 .1 (.43)
Verkehrstechnische Woche, Nr. 14, S. 200.

Bestand und Verkehr der **Kraftfahrzeuge** im deutschen Reich 1929-1930. (1 Seite & Diagr.)

1931 621 .137 .3
Verkehrstechnische Woche, Nr. 15, S. 206.

JANISCH. — Vom **Lokomotivfahrdienst.** (6 Seiten & Diagr.)

1931 625 .245 & 656 .225
Verkehrstechnische Woche, Nr. 15, S. 211.

Zur Frage des **Behälterverkehrs.** Fahrbare oder nichtfahrbare Behälter ? (2 Seiten.)

1931 656 .1 (.43) & 656 .2 (.43)
Verkehrstechnische Woche, Nr. 16, S. 217.

PLATZMANN. — **Landstrasse und Schienenweg** in ihrer geschichtlichen Entwicklung und gegenseitigen Einwirkung. (3 Seiten.)

1931 656 .211.5 & 721 .9
Verkehrstechnische Woche, Nr. 16, S. 220.

MILLER. — **Bahnsteigdächer** in Eisenbeton. (1 Seite & Abb.)

1931 656 .223.2
Verkehrstechnische Woche, Nr. 17, S. 229.

MARQUARDT. — Der **Güterwagendienst** und die Wagenbereitstellung. (1 Seite.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 621 .33
Zeitschr. Ver. deutsch. Ing. Nr. 25, 20. Juni, S. 778.

ROTH (P.). — **Elektrischer Betrieb auf Nebenbahnen** und nebenbahnähnlichen Kleinbahnen. (4 900 Wörter & Abb.)

1931 385 .571
Zeitschr. Ver. deutsch. Ing. Nr. 26, 27. Juni, S. 837.

KOTHE (E.).— **Ingenieurfortbildung.** (7 000 Wörter.)

1931 621 .116 & 621 .392
Zeitschr. Ver. deutsch. Ing. Nr. 26, 27. Juni, S. 859.

JURCZYK (K.). — **Geschweisste Hochdruckbehälter** und Armaturen. (5 400 Wörter & Abb.)

1931 62. (01 & 69. (01
Zeitschr. Ver. deutsch. Ing. Nr. 27, 4. Juli, S. 877.

KOMMERELL. — Das β-Verfahren Moerikes zur **Berechnung von Knickstäben** aus St 37 im Hochbau. (4 900 Wörter & Abb.)

1931 621 .9
Zeitschr. Ver. deutsch. Ing. Nr. 28, 11. Juli, S. 893.

PREGER (E.). — **Werkzeugmaschinen** mit höchsten Drehzahlen. (4 600 Wörter & Abb.)

1931 621 .335 (.494)
Zeitschr. Ver. deutsch. Ing. Nr. 28, 11. Juli, S. 911.

STOCKAR (R.). — Neue grosse **Schnell- und Güterzuglokomotiven** der Schweizerischen Bundesbahnen. (2 100 Wörter & Abb.)

1931 625 .5 (.434)
Zeitschr. Ver. deutsch. Ing. Nr. 29, 18. Juli, S. 921.

BENOIT (G.). — Die Schauinsland-Bahn eine neuartige **Personen-Seilschwebebahn** mit Umlaufbetrieb. (6 500 Wörter & Abb.)

Zeitung des Vereins deutscher Eisenbahnverwaltungen. (Berlin.)

1931 656 .23 (.43)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 10, S. 261.

FRITZE. — **Selbstkosten, Wirtschaftlichkeit und Fahrpreisermässigungen** der Deutschen Reichsbahn. (5 Seiten.)

1931 656 .283
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 10, S. 266.

EGER. — Kraftfahrzeughalter und Eisenbahn in **Zusammenstossfällen.** (1 Seite.)

1931 385 .4 (.438)
tung des Vereins deutscher Eisenbahnverwaltungen, Nr. 10, S. 268.
KIEFER. — Die Änderungen in der **Organisation** der lnischen Staatseisenbahnen. (2 1/2 Seiten.)

1931 656 .1 (.43)
tung des Vereins deutscher Eisenbahnverwaltungen, Nr. 11, S. 285.
TEUBNER. — Der **Lastkraftwagenverkehr** nach dem ıenker-Vertrage der Deutschen Reichsbahn. (2 1/2 ten.)

1931 625 .245 & 656 .26
tung des Vereins deutscher Eisenbahnverwaltungen, Nr. 12, S. 317.
ADAM. — Weitere Erfahrungen mit dem Einsatz chter **Güterzüge** (Gütertriebwagen) unter Verwenng von Behältern. (4 1/2 Seiten & Abb.)

1931 625 .172
tung des Vereins deutscher Eisenbahnverwaltungen, Nr. 12, S. 322.
BECK. — Der « **Lokomotivlaufschreiber** ». Ein neues rät zur mechanischen **Überwachung des Gleiszustan**s. (2 1/2 Seiten.)

1931 656 1. & 656 .2
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 12, S. 325.
WENDT. — Ein Beitrag zur **Bekämpfung des Kraftgenwettbewerbes.** (6 1/2 Seiten.)

1931 621 .13
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 13, S. 345.
CLEMENS. — Die **Lokomotivwirtschaft.** Eine Entgnung. (9 Seiten & Diagr.)

1931 656 .225
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 13, S. 352.
MOGH. — **Stückgut und Wagenladungen.** (6 Seiten.)

1931 313 .385
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 13, S. 358.
LANDSBERG. — System der **Eisenbahnstatistik.** Ein rschlag. (2 1/2 Seiten.)

1931 656 .225 (.43)
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 14, S. 373.
SOMMERLATTE. — Fragen des neuzeitlichen **Gübeförderungsdienstes.** (16 Seiten, Karten, Diagr. & ıb.)

1931 656 .222
itung des Vereins deutscher Eisenbahnverwaltungen, Nr. 14, S. 389.
MESTWERDT. — Ermittlung wirtschaftlicher. **Zugge-Abschnitte** mit Hilfe der neueren **Fahrzeitenbechnung.** (2 Seiten & Zeichn.)

1931 656 .1 (.44)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 14, S. 391.
Autolinien der Paris-Lyon-Mittelmeerbahn (P. L. M.) (2 Seiten & Karte.)

1931 656 .1 (.43) & 656 .2 (.43)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 15, S. 405.
KIENITZ. — **Reichsbahn und Schenkervertrag.** (6 Seiten.)

1931 385. (072 (.43)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 16, S. 429.
GEHR. — Das **Hauptprüfungsamt** der Deutschen Reichsbahn-Gesellschaft. (3 1/2 Seiten.)

1931 656 .237
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 16, S. 438.
HERMANN. — Zur Frage der begebbaren **Eisenbahntransporturkunden.** (5 Seiten.)

1931 656 .1 (.43) & 656 .2 (.43)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 17, S. 457.
Die Gemeinwirtschaftlichkeit des deutschen **Eisenbahntarifsystems** und der Kraftwagen. (3 1/2 Seiten.)

1931 656 .233
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 17, S. 464.
ZIEGLER. — **Frachtberechnung im Zwischenstaatlichen Güterverkehr** bei Benutzung eines Hilfsweges im Falle eines Beförderungshindernisses. (3 1/2 Seiten & Karte.)

1931 313 : 656 .225 (.43)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 18, S. 481.
STEUERNAGEL. — **Statistik der Güterbewegung** auf den deutschen Eisenbahnen. (4 Seiten.)

1931 656 .234 (.494)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 18, S. 485.
FISCHER. — **Fahrpreisvergünstigung für Familien.** (Familienbillete) in der Schweiz. (4 Seiten.)

1931 656 .211.5
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 19, S. 515.
WACHSMUTH. — Kritische Betrachtungen über das Zifferblatt der **Bahnhofsuhren.** (2 1/2 Seiten & Zeichn.)

1931 656 .253 (.42)
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 19, S. 518.
GLÄSEL. — Die Frage der **Zugbeeinflussung** in englischer Auffassung. (1 Seite.)

1931 656 .212
Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 20, S. 533.
FRÖLICH. — Die methodische Durchforschung der **Rangierbahnhöfe** und ihre innere Organisation. (15 Seiten & Abb.)

1931 621 .138

Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 20, S. 549.

WISCHMANN. — Neigungszeiger und **Lokomotivbetriebsdienst.** (4 Seiten & Zeichn.)

1931 385

Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 21, S. 565.

SARTER. — Gedanken über die **Werbung für die Eisenbahnen.** (12 Seiten.)

1931 656 .2

Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 21, S. 577.

VOIGT. — Die **Zeitstudie** im Verkehrs- und Verwaltungsdienst. (5 Seiten.)

1931 656 .286 (.43)

Zeitung des Vereins deutscher Eisenbahnverwaltungen, Nr. 21, S. 582.

FREUDENBERGER. — **Kraftfahrzeugunfälle** an Schienengleichen Bahnübergängen. Ein Streifzug durch die neuere Rechtsprechung. (3 Seiten.)

In English.

Electric Railway Journal. (New York.)

1931 625 .4 (.73)

Electric Railway Journal, July, p. 347.

JACOBS (R. H.). — Well-planned schedules speed **subway track construction.** (1 500 words & fig.)

1931 656 .26 (.73)

Electric Railway Journal, July, p. 351.

Putting **car maintenance** on a **calendar** basis. (2 000 words & fig.)

1931 625 .14 (.73) & 691 (.73)

Electric Railway Journal, July, p. 358.

PIERCE (A. E.). —**Precast concrete slabs** for temporary paving. (500 words & fig.)

Engineer. (London.)

1931 624 .62 (.73)

Engineer, No. 3936, 19 June, p. 670.

The Kill van Kull **bridge,** New York. (4 000 words & fig.)

1931 621 .116

temperatures. (900 words, tables & fig.)

KING (Ch. R.). — Origin and evolution of the **indirect system of heating steam boilers.** (5 000 words & fig.)

1931 625 .1 (.45)

Engineer, No. 3936, 19 June, p. 676.

The **Bologna-Florence direttissima railway and the Great Apennine tunnel.** (4 000 words & fig.)

1931 62. (

The Metallurgist, p. 83, supplement to the Engine 26 June.

ROSENHAIN (Dr. W.). — **Brinell hardness and tensile strength.** (2 500 words.)

1931 62. (01 & 669

The Metallurgist, p. 85, supplement to the Enginee 26 June.

Creep determinations on structural steels at high temperatures. (900 words, tables & fig.)

1931 669

The Metallurgist, p. 86, supplement to the Enginee 26 June.

High steam temperatures and steel. (1 800 words

1931 66

The Metallurgist, p. 87, supplement to the Enginee 26 June.

Metal cleaning. (2 400 words.)

1931 669 .

The Metallurgist, p. 91, supplement to the Enginee 26 June.

The **alloys of iron, vanadium and carbon.** (1 800 word & fig.)

1931 621 .331 (.42

Engineer, No. 3938, 3 July, p. 19

An automatically-controlled **rectifier** on the London Underground Railway. (3 000 words & fig.)

1931 656 .281 (01 (.42

Engineer, No. 3938, 3 July, p. 38.

The Leighton Buzzard fatal **derailment.** (1 300 words & fig.)

1931 656 .222 (.44)

Engineer, No. 3939, 10 July, p. 45.

The French summer railway **train services.** (1 000 words.)

1931 656 .245 (.42)

Engineer, No. 3939, 10 July, p. 47.

A **wagon** for locomotives. (800 words.)

1931 621 .392 (.42)

Engineer, No. 3939, 10 July, p. 48.

The Burke-Scott **electric welder.** (1 000 words & fig.)

1931 621 .131 .3

Engineer, No. 3940, 17 July, p. 69.

Locomotive testing plants. (3 500 words.)

1931 621 .131 .3

Engineer, No. 3940, 17 July, p. 72.

GRESLEY (H. N.). — **Locomotive experimental stations.** (4 000 words & fig.)

1931 669 .1

The Metallurgist, supplement to the Engineer, 31 July, p. 98.

The **alloys of iron, vanadium and carbon.** (1 200 words & fig.)

1931 62. (01
e Metallurgist, supplement to the Engineer, 31 July, p. 110.
'he relation between Rockwell and Brinell hardness.)0 words.)

1931 621 .4
gineer, No. 3941, 24 July, p. 97.
MALONE (J. F. J.). — A new prime mover. (5 400 rds & fig.)

1931 625 .172 (.42)
gineer, No. 3941, 24 July, p. 101.
The « Whitewash » coach. (1 000 words & fig.)

1931 669 .1
gineer, No 3942, 31 July, p. 115.
The behaviour of steel at high temperatures. (4 000 rds & fig.)

1931 621 .132 .8 (.82) & 621 .43 (.82)
gineer, No. 3942, 31 July, p. 116.
Rail coach for the Argentine. (700 words.)

Engineering. (London.)

1931 624 .8 (.71)
ngineering, No. 3414, 19 June, p. 787.
Vertical lift bridges, Welland ship canal. XX. (To be ntinued.) (4 000 words & fig.)

1931 656 .212 .8 (.42)
ngineering, No. 3414, 19 June, p. 790.
Chain meter for coal or grain flow. (800 words & .)

1931 621 .98
ngineering, No. 3414, 19 June, p. 793.
Electrically-driven wood-working machines. (1 500 ords & fig.)

1931 669 .1 (06 (.73)
ngineering, No. 3414, 19 June, p. 801.
The American Iron and Steel Institute. Abstracts of oceedings. (2 700 words & fig.)

1931 669
ngineering, No. 3414, 19 June, p. 813.
Case-hardening with liquid carburising agent. (800 ords & fig.)

1931 625 .245 (.73)
ngineering, No. 3414, 19 June, p. 813.
Petrol-electric breakdown crane. (250 words.)

1931 624 .8 (.71)
ngineering, No 3415, 26 June, p. 821.
Machinery of vertical-lift bridges, Welland ship canal. (2 800 words & fig.)

1931 669 .1
ngineering, No. 3415, 26 June, p. 839.
NORBURY (A. L.) & MORGAN (E.). — The effect carbon and silicon on the growth and scaling of grey st iron. (6 100 words, table & fig.)

1931 625 .245 (.42)
Engineering, No. 3417, 10 July, p. 39.
65-ton rail trolley for transporting locomotives. (500 words & fig.)

1931 62. (01 & 669
Engineering, No. 3417, 10 July, p. 56; No. 3418, 24 July, p. 120.
HANSON (D.). & WHEELER (A.). — The deformation of metals under prolonged loading. (10 900 words & fig.)

1931 536
Engineering No. 3418, 17 July, p. 63.
GILBERT (W.). — Multiple-bush hot air and gas pyrometer. (1 300 words & fig.)

1931 621 .94
Engineering, No. 3418, 17 July, p. 69.
Heavy duty vertical milling machine. (2 500 words & fig.)

1931 621 .131.3 (.43)
Engineering, No. 3418, 17 July, p. 79.
Locomotive testing plants. (2 000 words.)

1931 621 (06 (.42)
Engineering, No. 3418, 17 July, p. 81; No. 3419, 24 July, p. 111.
The Institution of Mechanical Engineers. Abstracts of Proceedings. (7 300 words.)

1931 621 .131.3 (.42)
Engineering, No. 3418, 17 June, p. 88.
GRESLEY (H. N.). — Locomotive experimental stations. (3 800 words & fig.)

1931 669
Engineering, No. 3419, 24 July, p. 115.
HOEHN (E.). — The strength of frontal and lateral welds. (4 300 words & fig.)

Engineering News-Record. (New York.)

1931 693
Engineering News-Record, No. 24, 11 June, p. 974.
HUTCHINSON (G. W.). — Hydraulic lime in concrete. (1 400 words & fig.)

1931 624
Engineering News-Record, No. 26, 25 June, p. 1048.
BERETTA (J. W.). — Rigid-frame bridge of 101 feet span at San Antonio. (800 words & fig.)

1931 621 .82 & 669
Engineering News-Record, No. 26, 25 June, p. 1058.
STANTON (Th. E.). — Friction tests on bearing plate materials. (2 800 words & fig.)

1931 621 .133.7 (.73)
Engineering News-Record, No. 26, 25 June, p. 1061.
JENKS (H. N.). — Water softening plant employs pumped recirculation for chemical mixing. (2 800 words & fig.)

1931 721 .1 (.73)
Engineering News-Record, No. 1, 2 July, p. 4.
Business as usual while moving an eight-story steel-frame building. (3 500 words & fig.)

1931 625 .4 (.73) & 721 .1 (.73)
Engineering News-Record, No. 1, 2 July, p. 10.
McINTOSH (W. T.). — Heavy building underpinning, Nassau-Broad St. subway. (2 100 words & fig.)

1931 625 .142.2 (.73)
Engineering News-Record, No. 2, 9 July, p. 56.
Railway tie prospects and developments. (600 words.)

1931 625 .13 (.73)
Engineering News-Record, No. 2, 9 July, p. 58.
KELLEY (C. F.). — Ventilation during driving of New York's 20-mile water tunnel. (1 400 words & fig.)

1931 624 .7 (.73)
Engineering News-Record, No. 2, 9 July, p. 61.
Steel bracing in concrete viaduct for longitudinal forces. (700 words & fig.)

1931 621 .392 & 721 .9
Engineering News-Record, No. 2, 9 July, p. 63.
ELLIS (A. R.). — Welded erection seat eliminates field bolts in welded steel frame. (1 400 words & fig.)

1931 625 .13 (.45)
Engineering News-Record, No. 2, 9 July, p. 65.
World's longest double-track tunnel pierces Italian Apennines. (1 500 words & fig.)

1931 624.2 (.73)
Engineering News-Record, No. 2, 9 July, p. 69.
Trestle and firebreaks on Kansas City Southern. (400 words & fig.)

Great Western Railway Magazine. (London.)

1931 625 .13 (.42)
Great Western Railway Magazine, August, p. 350.
CARPMAEL (R.). — Cementation in the Severn Tunnel. (2 500 words & fig.)

Journal, Permanent Way Institution. (London.)

1931 625 .27
Journal, Perm. Way Instit., April, p. 56.
KNOTTS (J. H.). — Engineer's department accounting. (11 000 words.)

1931 625 .144.4
Journal, Perm. Way Inst., April, p. 79.
BRINSMEAD (K.). — Permanent-way maintenance by machinery. (7 500 words.)

1931 621 .392 : 625 .151 (.42)
Journal, Perm. Way Inst., April, p. 94.
HARRISON (F. E.). — The building up of worn railway crossings by electric welding. (8 000 words.)

1931 623 : 625 .1 (.56 + .6
Journal, Perm. Way Inst., April, p. 110.
FRAZER (I. R.). — Military railways, Egyptian expeditionary force. (8 000 words.)

1931 625 .1
Journal, Perm. Way Inst., April, p. 133.
TAZEWELL (B.). — Maintenance of permanent wa (4 400 words.)

Mechanical Engineering. (New York.)

1931 385 .3 : 62 (.73
Mechanical Engineering, July, p. 503.
MANAMY (F. Mc.). — Engineering in its relation to the Interstate Commerce Commission. (9 000 words & fig.)

Modern Transport. (London.)

1931 656. (06 (.42
Modern Transport, No. 640, 20 June, p. 3.
Institute of Transport congress. Interest in develop ments at Rome. (2 400 words & fig.)

1931 656 .25 (06 (.42) & 656 .253 (.44
Modern Transport, No. 640, 20 June, p. 5.
Power signalling in France. State Railways installation at Batignolles. (1 800 words & fig.)

1931 621 .13 (0 (.73
Modern Transport, No. 641, 27 June, p. 6.
Railway locomotive progress in the United States A ten years' survey of development. (1 300 words & fig.

1931 656 .253 (.42)
Modern Transport, No. 641, 27 June, p. 7.
Signalling on London Underground Railways. Modernisation of equipment. (1 400 words & fig.)

1931 656 .1 (.42)
Modern Transport, No. 641, 27 June, p. 9.
Regulation of road transport services. (2 700 words.)

1931 621 .335 & 621 .43
Modern Transport No. 642, 4 July, p. 5.; No. 643, 11 July, p. 4.
Diesel-electric traction. (4 500 words.)

1931 38 & 656
Modern Transport, No. 643, 11 July, p. 3.
WHYTE (M. A.). — Transport and industrial development. (1 900 words.)

1931 625 .245 (.42)
Modern Transport, No. 643, 11 July, p. 7.
Transport of locomotives by rail. (900 words & fig.)

1931 385 .4 (.42)
Modern Transport, No. 644, 18 July, p. 3.
London Midland & Scottish Railway development. (1 600 words & fig.)

1931 621 .131.3 (.42)
[M]odern Transport, No. 644, 18 July, p. 6.
GRESLEY (H. N.). — **Factors influencing the efficiency of locomotives.** (1 700 words.)

1931 656
[M]odern Transport, No. 644, 18 July, p. 7.
International aspect of transport. (1 700 words.)

1931 656 .25 (.45)
[M]odern Transport, No. 645, 25 July, p. 3.
Signalling at Milan Central station. (800 words & fig.)

1931 347 .763 (.42) & 385.4 (.42)
[M]odern Transport, No. 645, 25 July, p. 4.
Post-war transport and the railways. (1 200 words.)

1931 624 .8 (.42)
[M]odern Transport, No. 645, 25 July, p. 5.
Canvey Island bridge. (900 words & fig.)

1931 621 .33 (.42)
[M]odern Transport, No. 646, 1 August, p. 3.
CHORETON (A. E. L.). — **Possibilities of British [coa]l production. Coal industry and alternatives to Weir [C]ommittee's proposals.** (1 700 words.)

1931 621 .33 (.42)
[M]odern Transport, No. 646, 1 August, p. 5.
Railway electrification. Gas industry and the Weir [re]port. (1 000 words.)

1931 656 .213 (.42)
[M]odern Transport, No. 646, 1 August, p. 6.
Industrial traffic management. No. 1. Private sid[in]gs. (900 words.)

1931 621 .132 .8 (.44) & 621 .43 (.44)
[M]odern Transport, No. 646, 1 August, p. 7.
Pneumatic-tyred rail vehicles. (400 words & fig.)

1931 656 .1 (.42)
[M]odern Transport, No. 646, 1 August, p. 13.
Railway companies and road transport. (2 500 words & fig.)

[Pr]oceedings, Institution of Mechanical Engineers. (London.)

1930 587 .8 & 62 (.1
[Pr]oceedings, Institution of Mechanical Engineers, December, p. 1133.
PULLIN (V. E.). — **X-rays in engineering practice.** ([…]500 words & fig.)

1931 621 .8 & 669 .1
[Pr]oceedings, Institution of Mechanical Engineers, December, p. 1159.
GOUGH (H. J.) & MURPHY (A. J.). — **The effect [of] low temperature on the shock-resisting properties of [ne]w wrought-iron chain.** (17 600 words, 7 tables & [fig].)

1930 621 .1
Proceedings, Institution of Mechanical Engineers, December, p. 1305.
BAUMANN (K.). — **Some considerations affecting the future development of the steam cycle.** (29 000 words, 2 tables & fig.)

1930 621 .5
Proceedings, Institution of Mechanical Engineers, December, p. 1397.
DEARDEN (J.). — **Compressed air and its applications.** (4 300 words & fig.)

1930 621 .2
Proceedings, Institution of Mechanical Engineers, December, p. 1409.
PAUL (C. S. T.). — **Propeller type water-turbines.** (3 700 words & fig.)

Proceedings, Institution of Railway Signal Engineers. (Reading).

1930-31 656 .25 (.492)
Proceed. Institut. Ry. Signal Eng., October 1930 to January 1931, p. 155.
DE VOS VAN NEDERVEEN CAPPEL (G. J.). — **Railway signalling in Holland.** (Paper and discussion). (7 400 words.)

1930-31 656 .05
Proceed. Institut. Ry. Signal Eng., October 1930 to January 1931, p. 179.
CASTLE (F. L.). & HORLER (F.). — **Street traffic signals.** (12 800 words.)

1930-31 01 .656 .25 (.42)
Proceed. Institut. Ry. Signal Eng., October 1930 to January 1931, p. 268.
Catalogue of the library, Institution of Railway Signal Engineers. (6 000 words.)

Railway Age. (New York.)

1931 625 .13 (.73)
Railway Age, No. 23, 6 June, p. 1100.
DICKERMAN (W. C.). — **The steam locomotive in America's railroad progress.** (2 800 words & fig.)

1931 385 (.73)
Railway Age, No. 23, 6 June, p. 1103.
Pennsylvania believes times right for making improvements. (3 500 words & fig.)

1931 656 .1 : 656 .2
Railway Age, No. 23, 6 June, p. 1108.
HALL (F.) & VAN DOREN (R. N.). — **What is fair competition ?** (4 900 words & fig.)

1931 621 .33 : 385 .11 (.485)
Railway Age, No. 23, 6 June, p. 1111.
Swedish electrification justified by operating results. (2 700 words & fig.)

1931 656 .22 (.71)
Railway Age, No. 23, 6 June, p. 1115.
NEEDHAM (C. F.). — **Combining speed with efficiency.** (3 100 words & fig.)

1931 651 : 656 .237 (.73)
Railway Age, No. 23, 6 June, p. 1118.
MALLOY (C. C.). — Southern Pacific **records** valued at $ 1 686 500 are wel protected. (3 000 words & fig.)

1931 656 .255 (.73)
Railway Age, No. 24, 13 June, p. 1140 & 1155.
Centralized traffic control on the Peoria & Pekin Union. (2 300 words & fig.)

1931 656 .21 (.73) & 656 .22 (.73)
Railway Age, No. 24, 13 June, p. 1143.
Reducing the operating ratio. Delaware and Hudson uses modern **methods to lower costs** and promote efficiency. (2 000 words, table & fig.)

1931 621 .139 (.73), 625 .18 (.73) & 625 .27 (.73)
Railway Age, No. 24, 13 June, p. 1146.
KRAMPF (L. P.). — Skids were the answer on Missouri Pacific. (1 800 words & fig.)

1931 656 .212 (.73) & 725 .32 (.73)
Railway Age, No. 24, 13 June, p. 1149.
Chicago and North Western completes $ 4 000 000 **express terminal.** (2 600 words & fig.)

1931 625 .232 (.52)
Railway Age, No. 24, 13 June, p. 1153.
YAMASHITA (O.). — **Observation-parlor cars** on the Japanese Imperial Railways. (900 words & fig.)

1931 621 .138 (.73)
Railway Age, No. 25, 20 June, p. 1181.
Motive power effectively maintained on the Union Pacific. (1 800 words, tables & fig.)

1931 385 .1 (.73)
Railway Age, No. 25, 20 Juin, p. 1185 & 1212.
United States railroads seek 15 per cent **rate increase.** (2 500 words.)

1931 656. (06 (.73)
Railway Age, No. 25, 20 June, p. 1187.
Superintendents meet in St. Louis (U. S. A.) (4 100 words & fig.)

1931 625 .13 (.71)
Railway Age, No. 26, 27 June, p. 1228.
Canadian Pacific drives mile **tunnel** to reach new ship terminal. (3 500 words & fig.)

1931 385. (061.4
Railway Age, No. 26, 27 June, p. 1240.
Mechanical Division holds twelfth annual meeting in Chicago. (17 500 words & fig.)

1931 656 .1 (.73)
Railway Age, No. 26, 27 June, p. 1254.
Reading **motor coaches** save 391 000 train miles. (2 800 words & fig.)

1931 656 .1 (.73) & 656 .222.6 (.7
Railway Age, No. 26, 27 June, p. 1257.
Fast service to meet competition. (2 300 words fig.)

1931 621 .132.8 (.73) & 621 .43 (.7
Railway Age, No. 1, 4 July, p. 4.
Baldwin oil-electric locomotive. (2 800 words & fi

1931 656 (06 (.7
Railway Age, No. 1, 4 July, p. 17.
Improving transportation methods. — Abstracts five papers and reports presented at the conventi of the Railroad Superintendents' Association. Part (5 000 words.)

1931 6
Railway Age, No. 1, 4 July, p. 22.
Admixture aids in long haul of concrete. (1 2 words & fig.)

1931 656 .29 (.7
Railway Age, No. 1, 4 July, p. 23.
Special agents study increased **robbery losses.** (3 0 words.)

1931 656
Railway Age, No. 2, 11 July, p. 43.
The way to **operating economies.** Article No. 1. (3 2 words & fig.)

1931 621 .132.5 (.7
Railway Age, No. 2, 11 July, p. 46.
Test locomotives of 4-8-2 and 2-6-6-2 types on t Baltimore & Ohio. (3 200 words & fig.)

1931 656 .255 (.7
Railway Age, No. 2, 11 July, p. 50.
Centralized traffic control on the Wabash. (3 2 words & fig.)

1931 625 .144.4 (.73) & 625 .17 (.7
Railway Age, No. 2, 11 July, p. 57.
A new type of **track maintenance unit.** (1 400 wo & fig.)

1931 621 .133.7 (.7
Railway Age, No 3, 18 July, p. 82.
Operating economy series. Better **water stations** wi save money. (2 800 words & fig.)

1931 621 .132.7 (.73) & 621 .43 (.7
Railway Age, No. 3, 18 July, p. 85.
Porter **gas-electric locomotive** for the Chicago, Bu lington & Quincy. (1 800 words & fig.)

1931 385 .3 (.73) & 656 .23 (.7
Railway Age, No. 3, 18 July, p. 87.
Rate hearings begun. (5 300 words & fig.)

1931 385 .586 (.73) & 656 .223.2 (.7
Railway Age, No. 3, 18 July, p. 91.
Efficiency tests. Car loading. Two of the reports practical problems, presented at the Railroad Superi tendents' convention, 9-12 June. (5 400 words.)

1931 656 .29 (.73)
ailway Age, No. 3, 18 July, p. 95.
Interstate Commerce Commission investigates pur-asing methods in St. Louis. (5 000 words.)

1931 355 (.73)
ailway Age, No. 3, 18 July, p. 104.
Transport co-ordination in the event of war. (1 900 ords.)

Railway Engineer. (London.)

1931 621 .135.2 & 625 .214
ilway Engineer, July, pp. 249 & 266.
Roller bearings for railway rolling stock. (2 300 words fig.)

1931 621 .132.6 (.437)
ilway Engineer, July, pp. 253 & 267.
New 2-8-4 tank locomotives, Czecho-Slovakian State ilways. (1 400 words & fig.)

1931 625 .616 (.54) & 625 .617 (.54)
ilway Engineer, July, p. 255.
Barsi light railway workshops extension. (3 000 words fig.)

1931 625 .143 (.42)
ilway Engineer, July, pp. 259 & 263.
HENRY HILLS. — Long rails on the London and orth Eastern Railway. (600 words & fig.)

1931 625 .154 (.42)
ilway Engineer, July, p. 261.
The Mundt locomotive turntable. (2 000 words & fig.)

1931 625 .19
ilway Engineer, July, p. 268.
Earthquakes in Burma and their effect on the rail-ay. (1 300 words & fig.)

1931 621 .131.3 & 621 .133.2
ilway Engineer, July, pp. 270 & 275.
Tests of locomotives with thermic syphons. (2 700 ords, tables & fig.)

1931 625 .258 (.42)
ilway Engineer, July, p. 273.
The eddy current rail brake. (1 200 words & fig.)

1931 621 .132.8 & 621 .43
ilway Engineer, July, p. 276.
The Diesel compressed air locomotive. (3 500 words fig.)

1931 621 .13 & 621 .33
ilway Engineer, August, p. 286.
Steam locomotive development and electrification. 000 words.)

1931 656 .25 (.42)
ilway Engineer, August, p. 289.
An interesting innovation in power signalling. Auto-atic compressor plant. (3 000 words & fig.)

1931 51. (08
Railway Engineer, August, p. 291.
A useful permanent-way rule. (300 words & fig.)

1931 621 .91 & 621 .95
Railway Engineer, August, p. 292.
A new machine-tool for railway and locomotive shops. (2 700 words & fig.)

1931 621 .33 (.54)
Railway Engineer, August, p. 296.
Madras suburban electrification, South Indian Rail-way. (5 400 words & fig.)

1931 621 .132.8 (.492)
Railway Engineer, August, p. 306.
A new Diesel locomotive development. (1 800 words & fig.)

1931 51. (08
Railway Engineer, August, p. 307.
JACKSON (P. H.). — Tables of trigonometrical func-tions for railway crossings. (300 words & tables.)

1931 621 .132.8 (.87)
Railway Engineer, August, p. 308.
A new steam rail car for South America. (2 400 words & fig.)

1931 621 .13 (0 (.73)
Railway Engineer, August, p. 311.
DICKERMANN (W. C.). — The locomotive on the railroads battlefield. (4 700 words & fig.)

Railway Engineering and Maintenance. (Chicago.)

1931 625 .13 (.73)
Railway Engineering and Maintenance, July, p. 632.
Fourteen years of tunnel-lining work on the South-ern Pacific. (5 600 words & fig.)

1931 625 .164 (.73)
Railway Engineering and Maintenance, July, p. 638.
FORD (H. L.). — Chicago, Burlington & Quincy grows trees for snow breaks. (700 words & fig.)

1931 625 .141
Railway Engineering and Maintenance, July, p. 639.
NEUBERT (J. V.). — This question of ballast. (1 600 words & fig.)

1931 625 .18 (.73)
Railway Engineering and Maintenance, July, p. 640.
Picking up scrap every day. (1 400 words & fig.)

1931 691 & 694
Railway Engineering and Maintenance, July, p. 642.
BELCHER (R. S.). — Finding new applications for treated timber. (4 000 words & fig.)

1931 614 .8 (.73) & 656 .25 (.73)
Railway Engineering and Maintenance, July, p. 646.
Pennsylvania puts force behind its safety rules. (3 500 words.)

Railway Gazette. (London.)

1931 621 .33 (.255)
Railway Gazette, No. 25, 19 June, p. 893.
PAVIA. — The Genoa division of the Italian State Railways. (400 words & fig.)

1931 621 .9 (.42) & 621 .138.5 (.42)
Railway Gazette, No. 25, 19 June, p. 895.
New plant at the Swindon works of the Great Western Railway. (700 words & fig.)

1931 656 (06 (.42)
Railway Gazette, No. 25, 19 June, p. 901.
Institute of Transport **congress and tour** in Italy. (1 200 words & fig.)

1931 656 .25 (08 (.42) & 656 .253 (.44)
Railway Gazette, No. 25, 19 June, p. 903.
Institution of Railway Signal Engineers' summer **meeting** in Paris. (800 words & fig.)

1931 656 .262 (.42)
Railway Gazette, No. 26, 26 June, p. 925.
Modern **railway hotels and restaurants.** I. (1 000 words & fig.)

1931 621 .132.5 (.91)
Railway Gazette, No. 26, 26 June, p. 929.
New **three-cylinder 4-6-2 type locomotives** for the Federated Malay States Railways. (1 500 words & fig.)

1931 651
Railway Gazette No. 26, 26 June, p. 934.
A remarkable **recording system.** (1 400 words & fig.)

1931 656 .253 (.42)
Railway Gazette, No. 26, 26 June, p. 936.
Re-signalling Hammersmith station, London Underground Railways. (600 words & fig.)

1931 385 .4 (.73) & 651 (.73)
Railway Gazette, No. 1, 3 July, p. 4.
American railway **office accommodation.** (700 words.)

1931 385. (071 : 625 .14 (.42)
Railway Gazette, No. 1, 3 July, p. 9.
ELLSON (G.). — **Instruction classes for permanent way men** on the Southern Railway. (1 400 words & fig.)

1931 656 .262 (.42)
Railway Gazette, No. 1, 3 July, p. 11.
Opening of Welcombe **hotel,** Statford-on-Avon, London Midland & Scottish Railway. (1 800 words & fig.)

1931 625 .144.4 (.44)
Railway Gazette, No. 1, 3 July, p. 12.
The « measured **packing** » system of **permanent-way.** **(1 600 words & fig.)**

1931 621 .132.8 (.8
Railway Gazette, No. 1, 3 July, p. 14.
New **oil-burning 4-8-0 locomotive,** Buenos Ay Western Railway. (600 words & fig.)

1931 625 .261 (.4
Railway Gazette, No. 1, 3 July, p. 16.
Motor vehicles for railway use. (1 800 words & fi

1931 656 .281 (01 (.4
Railway Gazette, No. 2, 10 July, p. 36.
The Carlisle **accident report.** (4 700 words.)

1931 656 .211 (.42) & 725 .31 (.4
Railway Gazette, No. 2, 10 July, p. 47.
New station at Hastings, Southern Railway. (2 1 words & fig.)

Railway Magazine. (London.)

1931 656 .222.1 (.4
Railway Magazine, August, p. 93.
ALLEN (C. J.). — British **locomotive practice** a **performance.** (5 200 words & fig.)

1931 656 .222.1 (.4
Railway Magazine, August, p. 115.
Modern **locomotive work** in France. (5 200 words fig.)

Railway Mechanical Engineer. (New York.)

1931 621 .138.5 (.7
Railway Mechanical Engineer, June, p. 273.
Chesapeake & Ohio **locomotive shops** at Huntingto Western Virginia. (7 000 words, 4 tables & fig.)

1931 621 .138 (.7
Railway Mechanical Engineer, June, p. 286.
Modernizing **locomotive terminals** on the Great Nort ern. (4 900 words & fig.)

1931 625 .235 (.7
Railway Mechanical Engineer, June, p. 292.
Passenger-car spray painting at Milwaukee shop (4 900 words, 4 tables & fig.)

1931 625 .
Railway Mechanical Engineer, June, p. 298.
RICHMOND (B. C.). — **Is the big car shop justifie** (6 000 words & fig.)

Railway Signalling. (Chicago.)

1931 656 .255 (.7
Railway Signalling, June, p. 195.
Centralized traffic control on the Peoria & Pek Union. (4 200 words & fig.)

1931 656 .255 (.7
Railway Signalling, June, p. 201.
Chicago Great Western **saves $ 7 000 annually** **remote control of tunnel interlockings.** (3 200 wo & fig.)

1931 656 .255 (.73)
ailway Signalling, June, p. 206.
Missouri Pacific installs **centralized traffic control** 1 32 miles of double track. (2 500 words & fig.)

1931 621 .392 (.71)
ailway Signalling, June, p. 209.
Canadian Pacific uses electric carbon **arc welding to** stall signal bonds. (800 words & fig.)

1931 621 .31 & 656 .25 (06 (.73)
ailway Signalling, June, p. 211.
Study of **moisture in relays.** (2 800 words.)

1931 621 .33 (.73) & 656 .25 (.73)
ilway Signalling, June, p. 213.
OLER (B. F.). — **Signalling for electrified operation.** 000 words & fig.)

1931 656 .255 (.73)
ilway Signalling, July, p. 231.
Centralized traffic control installed on Wabash. 000 words & fig.)

1931 656 .257 (.71)
ilway Signalling, July, p. 237.
TAYLOR (E. S.). — Cadorna **interlocking** on the Ca- dian Pacific at Quebec. (3 500 words & fig.)

1931 656 .256 .3 (.73)
ilway Signalling, July, p. 243.
Automatic signals expedite traffic on the Chesa- ake & Ohio. (1 400 words & fig.)

1931 656 .257 (.73)
ilway Signalling, July, p. 245.
New **interlocking** on the Toronto, Hamilton & Buf- lo at Hamilton, Ont. (2 400 words & fig.)

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uth African Railways and Harbours Magazine. (Johannesburg.)

1931 385. (09 (.68)
uth African Rys. & Harbours Mag., June, p. 787.
MORE (J. R.). — The **South Africa Union's trans- rtation organisation** attains its majority. Sidelights the past : The system to-day. (19 000 words & fig.)

In Spanish.

Ingenieria y Construcción (Madrid).

1931 627 .82 & 721 .9
genieria y Construcción, Junio, p. 341.
La **tecnica y la economia de las presas de hormigón** masa y armado. (11 000 palabras & fig.)

1931 624 .32 (.460)
Ingenieria y Construcción, Julio, p. 400.
Nuevo **puente** sobre el rio Francoli. (2 900 palabras & fig.)

1931 385 (.460)
Ingenieria y Construcción, Julio, p. 415.
SALTO (M.). — Ideas para la **resolución del proble- ma ferroviario.** (1 400 palabras.)

Los Transportes. (Madrid.)

1931 621 .132.8 & 625 .3
Los Transportes, No. 306, 15 Junio, p. 185.
Proyecto de un **ferrocarril** a base del nuevo sistema **llamado aero-tracto-carril.** (2 500 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1931 691
Revista de Obras Públicas, N° 12, 15 de Junio, p. 233.
RENGADE (E.). — Los **cementos** para trabajos en el mar. (4 800 palabras & fig.)

1931 621 .33 (.42)
Revista de Obras Públicas, N° 12, 15 de Junio, p. 242.
REPARAZ (F.). — **Electrificación** de los ferrocarriles ingleses. (2 200 palabras & fig.)

1931 621 .33 (.460)
Revista de Obras Públicas, N° 12, 15 de Junio, p. 225, N° 13, 1 de Julio, p. 257; N° 14, 15 de Julio, p. 275.
GARCIA LOMAS (J.). — Las recientes **electrificacio- nes** de la Compañia de los Caminos de Hierro del Norte de España. (12 000 palabras & fig.)

1931 624 .6 & 721 .4
Revista de Obras Públicas, N° 14, 15 de Julio, p. 287.
FERNANDEZ CASADO (C.). — **Teoria del arco.** (2 600 palabras & fig.)

In Italian.

Rivista delle Comunicazioni ferroviarie. (Roma.)

1931 656 .211 (.45)
Rivista delle Comunicazioni ferroviarie, N° 13, 1° Luglio, p. 15.
La nuova **stazione centrale** di Milano. (2 400 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1931 621 .335 (.45)
Rivista tecnica delle ferrovie italiane, 15 giugno, p. 257.
BIANCHI (G.) & ELENA (S.). — Descrizione delle **locomotive trifasi,** gruppo E 554 ed E 432. (Continua.) (9 600 parole & fig.)

1931 625 .2 & 669
Rivista tecnica delle ferrovie italiane, 15 giugno, p. 304.
GIOVENE (N.). — **Aluminio e leghe leggere nella costruzione del materiale rotabile.** (4 500 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 621 .132.1 (.492)
De Ingenieur, N° 27, 3 Juli, p. 99.
LABRIJN (P.). — De nieuwste **locomotieven** der Nederlandsche Spoorwegen. (9 000 woorden & fig.)

1931 621 .33 (.492) & 656 .22 (.492)
De Ingenieur, N° 28, 10 Juli, p. 63.
VERSCHOOR (H. E.). — **Electrificatie en dienstregeling N. S.** (2 400 woorden & fig.)

De Locomotief. (Amsterdam.)

1931 625 .62 & 656 .1
De Locomotief, N° 13, 1 Juli, p. 98.
Stadstram of stadsbus. Stadstram en stadsbus. (4 900 woorden.)

Spoor- en Tramwegen. (Utrecht.)

1931 621 .33 (.492)
Spoor- en Tramwegen, N° 13, 23 Juni, p. 339.
HEYLIGERS (F. J.). — Het **electrisch materieel** der Nederlandsche Spoorwegen. (2 400 woorden & fig.)

1931 621 .33 (.492)
Spoor- en Tramwegen, N° 13, 23 Juni, p. 346; N° 14, 7 Juli, p. 18; N° 2, 21 Juli, p. 41.
VAN LESSEN (H. J.). — **De electrificatie van de** lijnen Amsterdam-Alkmaar en Velsen-Uitgeest. (Wordt vervolgd.) (5 500 woorden & fig.)

1931 621 .132.1 (.492)
Spoor- en Tramwegen, N° 14, 7 Juli, p. 1; N° 2, 21 Juli, p. 32.
LABRIJN (P.). — Eenige nieuwe details bij de nieuwe **locomotieven** der Nederlandsche Spoorwegen. (4 800 woorden & fig.)

1931 625 .251
Spoor- en Tramwegen, N° 14, 7 Juli, p. 6.
FELIX (J. P.). — De **Westinghouse-rem,** van een practisch standpunt bezien. (2 400 woorden & fig.)

1931 385 .112 (.492)
Spoor- en Tramwegen, N° 14, 7 Juli, p. 16.
De **Nederlandsche Spoorwegen** over 1930. (1500 woorden & fig.)

In Polish.

INŻYNIER KOLEJOWY. (Warszawa).

1931 385 .11
Inzynier Kolejowy, 1 Lipca, str. 201.
HREBNICKI (Z.). — Współczynnik eksploatac Kolei jako miernik sprawnosci funkcjonowania aparat kolejowego. (3 000 słowa & 3 stoty.)

1931 621 .133.
Inzynier Kolejowy, 1 Lipca, str. 214.
NEHRING (St.). — Rozpylacze smaru, jako srode zapobiegawczy tworzeniu sie twardego osadu w cylin drach parowych i skrzynkach suwaków parowozów (1 200 słowa & rys.)

In Portuguese.

Gazeta dos Caminhos de ferro. (Lisboa.)

1931 385. (09 (.469
Gazeta dos Caminhos de Ferro, N° 1044, 16 de Junho p. 237; N° 1045, 1 de Julho, p. 261; N° 1046, 16 de Julho, p. 287.
TORRES (C. M.). — **O Caminho de ferro em Portugal.** (Continua.) (8 400 palavras.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1931 621 .33 (.72)
Revista das Estradas de ferro, 15 Julho, p. 282.
A electrificação da Estrada « Ferro-Carril Mexicano » (Continua.) (2 400 palavras & fig.)

In Rumanian.

(= 599)

Revista C. F. R. (Bucuresti.)

1931 656 .225 (.498) = 599
Revista C. F. R., N° 4, p. 107.
VANGHELESCU. — **Trains rapides** pour le transport de petits colis en Roumanie. (6 000 mots & diagr.)

In Serbian.

(= 91.886)

Casopis pro železniční právo a politiku. (Praha.)

1931 385 .1 = 91 .886
Casopis pro zeleznicni právo a politiku, N° 1, p. 1; N° 2, p. 31.
RUSAK. — **Le rendement** en tant que **suprême principe financier et administratif dans les entreprises** d'Etat. (23 200 mots.)

1931 347 .762 (.45) = 91 .886
›opis pro zeleznicni právo a politiku, N° 1, p. 15.
.KUBES. — Le contrat de transport d'après le pro- de la nouvelle loi italienne sur le commerce. (6 400 ›ts.)

1931 625 .6 (.44) = 91 .886
›opis pro zeleznicni právo a politiku, N° 2, p. 25.
SLADEK. — Les chemins de fer d'intérêt local en ınce. (5 600 mots.)

1931 347 .763.4 = 91 .886
›opis pro zeleznicnu právo a politiku, N° 3, p. 56; N° 4, p. 85.
HUSACK. — Les droits et les obligations du chemin fer et des usagers dans les opérations des douanes fiscales ainsi que vis-à-vis des actions de la police d'autres autorités administratives. (14 200 mots.)

1931 625 .611 (.437) = 91 .886
sopis pro zeleznicni právo a politiku, N° 5, p. 97; N° 6, p. 103.
KREJSA. — La réglementation au point de vue juri- que et financier, des chemins de fer privés exploités r les chemins de fer de l'Etat tchécoslovaque. (4 800 ›ts.)

Zeleznični Revue. (Praha.)

1931 656 .25 = 91 .886
leznicni Revue, N° 5, p. 66; N° 6, p. 83; N° 7, p. 99; N° 8, p. 115; N° 9, p. 131; N° 10, p. 147.
SVOBODA. — Quelques questions de la science ayant ur but de garantir la sécurité de l'exploitation des emins de fer. (10 600 mots et fig.) (A suivre.)

1931 625 .611 (.437) = 91 .886
leznicni Revue, N° 6, p. 81; N° 7, p. 97.
KREJZA. — Remise du chemin de fer local Otroko- e-Zlin-Vizovice en exploitation privée. (4 200 mots.)

1931 656 .286 = 91 .886
leznicni Revue, N° 9, p. 133.
PELIKAN. — Diminution du nombre des accidents x passages à niveau. (1 400 mots.)

1931 656 .24 = 91 .886
leznicni Revue, N° 9, p. 139; N° 10, p. 155.
CHMELAR. — Responsabilité des dommages causés r l'automobile ou le chemin de fer. (2 600 mots.)

Zprávy železničnich inženýrů. (Praha.)

1931 385 .11 (.437) = 91 .886
›rávy zeleznicnich inzenyru, N° 2, p. 36; N° 3, p. 64.
KOLLER. — Etude sur la question du capital de emier établissement des chemins de fer de l'Etat tché- slovaque. (Suite et fin.) (7 700 mots.)

1931 625 .113 = 91 .886
›rávy zeleznicnich inzenyru, N° 3, p. 60; N° 4, p. 86.
PAUKERT. — Réparation des courbes déformées de voie. (8 600 mots & fig.)

1931 625 .4 = 91 .886 & 625 .5 = 91 .886
Zprávy zeleznicnich inzenyru, N° 3, p. 68.
NEVRLY. — Les funiculaires ordinaires et aériens. (3 300 mots.)

1931 656 .257 = 91 .886
Zprávy zeleznicnich inzenyru, N. 4, p. 91.
ROHAC. — Commande mécanique des aiguilles à grandes distances. (4 300 mots & fig.)

1931 621 .131.1 = 91 .886
Zprávy zeleznicnich inzenyru, N. 4, p. 94.
BREJCHA. — Approvisionnement des locomotives en sable à l'aide d'air comprimé. (2 100 mots & fig.)

1931 385 = 91 .886
Zprávy zeleznicnich inzenyru, N. 4, p. 96.
PETRIVALSKY. — Peut-on prévoir une crise en trafic de chemins de fer ? (2 200 mots.)

1931 621 .133. (01 = 91 .886 & 621 .133.1 = 91 .886
Zprávy zeleznicnich inzenyru, N° 5, p. 105.
KOREF. — Le rendement limite de la chaudière de locomotive pour les différentes espèces de charbon. (5 000 mots & diagr.)

1931 625 .5 = 91 .886
Zprávy zeleznicnich inzenyru, N° 5, p. 110.
NEVRLY. — Les câbles en acier des funiculaires servant aux transports publics. (2 000 mots.)

1931 625 .162 = 91 .886 & 656 .254 = 91 .886
Zprávy zeleznicnich inzenyru, N° 5, p. 112.
KLEMENTA. — Protection des passages à niveau moyennant des signaux optiques ou des barrières automatiques. (2 000 mots.)

1931 625 .143.3 = 91 .886
Zprávy zeleznicnich inzenyru, N° 5, p. 115.
HAJEK. — Réparation des vieux rails. (2 000 mots.)

In Czech.

(= 91.882)

Saobraćajni pregled. (Beograd.)

1931 621 .132.1 (.497.1) = 91 .882
Saobracajni pregled, N° 3, p. 81.
GREBENAROVIC. — Les nouvelles locomotives yougoslaves à voie normale. (7 pages.)

1931 656 .223.2 = 91 .882
Saobracajni pregled, N° 3, p. 88.
SCEGLOVITOV. — Rendement des wagons à marchandises de grande capacité. (3 pages.)

1931 656 .23 = 91 .882
Saobracajni pregled, N° 3, p. 93.
CUGMUS. — Théorie de la politique de tarifs eu égard aux chemins de fer en tant qu'entreprises autonomes. (1 800 mots.)

1931 **625 .151 & 656 .222 = 91 .882**
Saobracajni pregled, N° 3, p. 100.
REPIC. — **Croisement des trains.** (4 500 mots & fig.)

1931 **656 .22 = 91 .882**
Saobracajni pregled, N° 3, p. 105.
ISAKOVIC. — **Les dépenses occasionnées par la marche d'un train.** (5 400 mots & diagr.)

1931 **656 .22 = 91 .882**
& 656 .222.3 = 91 .882
Saobracajni pregled, N° 3, p. 111.
STOJNIC. — **Economies à réaliser à la formation des trains.** (3 600 mots et fig.)

1931 **621 .132.1 (.497.1) = 91 .882**
Saobracajni pregled, N° 3, p. 130.
POPOVIC. — **Les nouvelles locomotives yougoslaves.** (900 mots.)

1931 **656 .25 (0 = 91 .88**
Saobracajni pregled, N° 4, p. 147.
REPIC. — **Les principes logiques et psychologique de la signalisation dans les chemins de fer.** (3 600 mot & fig.)

1931 **656 .222.1 = 91 .88**
Saobracajni pregled, N° 4, p. 151.
STOJNIC. — **Vitesse des trains et calcul des durée de parcours des trains.** (5 400 mots & table.)

1931 **625 .17 (.497.1) = 91 .88**
Saobracajni pregled, N° 5, p. 187.
MILKOVIC. — **L'Etat du ballast et des traverse dans les voies du réseau de la Direction régionale d Beograd.** (5 500 mots.)

1931 **625 .172 = 91 .882 & 624 = 91 .88**
Saobracajni pregled, N° 5, p. 193.
KRICK. — **L'entretien efficace du rail sur les ponts métalliques.** (7 000 mots.)

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[016 .385. (02]

I. — BOOKS.

In French.

1931 651
L'organisation de bureau et la mécanographie.
Paris (6e), Comité National de l'Organisation Française, 44, rue de Rennes.

1931 621 .83
.RIGNON (J.).
Les procédés modernes de taille des engrenages.
Paris (6e) Dunod, 92, rue Bonaparte. Un volume (.3 × 21 cm.), 96 pages, 84 figures. (Prix : 22 francs.)

1931 385. (09 (.65)
GGI (J.).
Les chemins de fer d'intérêt général de l'Algérie.
Paris, Larose. Un volume, 590 pages. (Prix : 85 francs.)

1931 654
.YNAUD-BONIN.
La recherche des qualités acoustiques en téléphonie. problème de la télégraphie rapide.
Paris, Les Presses Universitaires de France. Un volume, 170 pages, 110 figures. (Prix: 45 francs.)

1931 313 .385
Statistique internationale des chemins de fer, année .29.
Paris, Union internationale des chemins de fer, rue Prony, 10. Un volume (24 × 31.5 cm.), 14 tableaux. (Prix: 50 francs.)

1931 385. (01 (.67)
.SSAL (Gabrielle & Joseph).
Fahrzeit, Motorleistung und Wattstundenverbrauch .le. Pointe-Noire, Matadi, Lobito.
Paris, Roger, P. Un volume, 255 pages et cartes. (Prix: 15 francs.)

In German.

1931 621 .333
BUCHHOLD (Th.) & TRAWNIK (F.).
Die elektrischen Ausrüstungen der Gleichstrombahnen.
Berlin, Julius Springer. Ein Band, 312 Seiten und 267 Abbildungen. (Preis: 32 R.M.)

1931 656 .2
Die Praxis im Eisenbahn-Verkehrswesen.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 44 Seiten. (Preis: 1.25 R. M.)

1931 621 .392
KLOSSE (E.).
Das Lichtbogenschweissen.
Berlin, Julius Springer. 1 Band, 56 Seiten & 65 Abbildungen. (Preis: 2 R.M.)

1931 621 .13 (02
MEINCKE (F.).
Kurzes Lehrbuch des Dampflokomotivbaues.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 222 Seiten, 3 Tafeln und 183 Abbildungen. (Preis: 16.50 R.M.)

1931 621 .1
PUSCHMANN.
Die Dampfmaschine.
Leipzig, Dr. Max Jänecke. (Preis : 3.60 R.M.)

1931 656 .21(.4)
Stationsverzeichnis der Eisenbahnen Europas.
Berlin-Wilmersdorf, Barthol & Cie. (Preis: 28 R.M.)

1931 625 .62
VOIGTLÄNDER (H.).
Fahrzeit, Motorleistung und Wattstundenverbrauch bei Strassen- und Stadtschnellbahnen.
Berlin, Julius Springer. Ein Band, 64 Seiten. (Preis: 8.50 R.M.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by WEISSENBRUCH in the number for November, 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1931 624 .91

Vorläufige Bestimmungen für Holztragwerke (B.H.).

Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 20 Seiten. (Preis: 1.40 R.M.)

1931 656 .21

WEGELE (H.).

Bahnhofsanlage. 2. Hoch- und Tiefbauten der Bahnhöfe.

Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 138 Seiten, 1 Tafel und 88 Abbildungen. (Preis: 1.80 R.M.)

In English.

1931 697

ALLEN (J. R.) & WALKER (J. H.).

Heating and ventilation.

New York, McGraw-Hill Book Co. 1 Volume (6 × 9 inches), 426 pages, illustrations, diagrams, charts and tables. (Price: $ 4.)

1931 51 (08

BALLANTINE (J. P.).

Macmillan table slide rule.

New York, Macmillan Co. 1 volume (9 × 11 inches), tables. (Price: $ 0.50.)

1931 691

BOULTON (Sir H.), C.V.O., C.B.E.

A century of wood preserving.

London, Ph. Allan & Company, Limited. (Price: 8 sh. 6 d. net.)

1931 625 .143.4

HOWE (B. A.), Deputy Chief Engineer, East Indian Railway and SWAIN (L. H.), Bridge Engineer, East Indian Railway.

Investigation into the strength of rail joints. (Technical paper No. 276, Railway Board, Government of India. Calcutta, Central Publication Branch, Government of India. 1 pamphlet (9 3/4 × 6 1/4 inches) of 16 pages, 10 plates. (Price : 10 annas or 1 sh.).

1931 331 (.42)

SAMUELS (H.).

The law relating to industry.

London, Sir Isaac Pitman & Sons, Limited. (Price: 15 sh. net.)

1931 656 .257 (.73) & 656 .258 (.73)

SIGNAL SECTION, AMERICAN RAILWAY ASSOCIATION.

American Railway Signaling Principles and Practices. Chapter XVI: Interlocking.

New York, N. Y., Signal Section, A. R. A., 30, Ves- Street. 1 pamphlet (6 × 9 inches) of 66 + 18 pag with 43 figures. (Price, including postage: 25 cts. f members and railroad employees — 35 cts. for no members and not railroad employees. — Binder accommodate 13 chapters, $ 1.00 including postage.)

1931 6

SLOANE (R. C.), McCAUGHEY (W. J.), FORSTE (W. D.) & SHREVE (C.).

Effect of calcium chloride as an admixture in Por land cement concrete.

Columbus (Ohio), Ohio State University. 1 volun (6 × 9 inches), 81 pages and figures. (Price: 50 cents

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1931 072 & 62. ((

SMALLWOOD (J. C.) & KEATOR (F. W.).

Mechanical laboratory methods.

New York (N. Y.), Van Nostrand, D. & Co. 1 volum (6 × 10 inches), 386 pages, illustrations, diagram charts and tables. (Price: $ 3.50.)

1931 656 .

SMITH (W. L.).

Air transport operation.

New York, McGraw-Hill Book Co. 1 volume (6 × 1 inches), 316 pages, illustrations, diagrams, charts maps and tables. (Price: $ 4.)

In Italian.

1931 625 .142 .

PANDOLFI (P.).

Nuova traversa in cemento armato per ferrovie e tranvie.

Milano, Unitas. 1 libro, 26 pagine e figure.

1931 656 .1 & 656 .2

TACOLI (G. B.).

Concorrenza e collaborazione fra autotrasporti e ferrovie.

Reggio Emilia, Officine Grafiche Fasciste. 1 libro, 18 pagine.

In Portuguese.

1931 385. (09 (.469)

TORRES (C. M.).

O caminho de ferro em Portugal. Apontamento cronologico relativo ao periodo de 1845 a 1930.

Lisboa, Gazeta dos Caminhos de Ferro. Séca, 7. 1 vol., 81 paginas.

[016 .385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1931 **62. (01**

ın. des ponts et chauss., mai-juin, p. 136.

LANG (H.). — **Résistance d'un cadre rectangulaire** umis à l'action de forces perpendiculaires à son plan. 500 mots & fig.)

1931 **624 .63 (.44)**

ın. des ponts et chauss., mai-juin, p. 151.

LAZARD. — **Réparation aux arcs d'un pont en ton armé par la** méthode des **injections.** (6 000 ›ts & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

1931 **625 .13 (.73)**

ın. des travaux publics de Belgique, juin, p. 363.

THONET. — Les **tunnels pour véhicules** aux Etats-ıis. (37 500 mots & fig.)

Bulletin de la Société belge des Ingénieurs et des Industriels. (Bruxelles.)

1931 **385. (09 (.493)**

ıll. de la Soc. belge des Ingénieurs et des Industriels, n° 2, mars-avril, p. 99.

LAMALLE (U.). — **Le rôle de la Belgique dans le** veloppement des chemins de fer. 1re partie : Les emins de fer en Belgique. — 2e partie : Les Belges les chemins de fer à l'étranger. (20 000 mots, ta-ıaux, cartes & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1931 **621 .33 (.44)**

ıll. de la Soc. des ing. civ. de France, janvier-février, p. 73.

BACHELLERY. — **L'électrification** des chemins de du Midi. (6 500 mots.)

1931 **621 .33 (.44)**

ıll. de la Soc. des ing. civ. de France, janvier-février, p. 87.

PARODI. — **Electrification** de la Compagnie du ·min de fer d'Orléans. (10 000 mots.)

1931 **621 .33 (.44)**

ll. de la Soc. des ing. civ. de France, janvier-février, p. 105.

TAPIOT. — **L'électrification** de la ligne de Modane . L. M.). (8 500 mots & fig.)

1931 **621 .33 (.44)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 123.

LÉVY (J.). — **Electrification** des lignes de banlieue du réseau de l'Etat. (11 400 mots & fig.)

1931 **621 .33 (.44)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 146.

BACHELLERY. — Etat actuel de **l'électrification** sur les Grands Réseaux de chemins de fer français. (9 000 mots.)

1931 **621 .33 (.492)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 162.

VAN LESSEN. — **L'électrification** de quelques lignes du réseau des chemins de fer néerlandais. (7 800 mots & fig.)

1931 **621 .33 (.494)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 181.

HUBER-STOCKAR. — **L'électrification** des Chemins de fer fédéraux de Suisse. (13 800 mots.)

1931 **621 .33 (.43)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 208.

MICHEL (O.). — Le développement de la **traction électrique** sur les chemins de fer allemands. (6 900 mots.)

1931 **621 .33 (.45)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 220.

BIANCHI. — Etat actuel de **l'électrification** des chemins de fer en Italie. (14 400 mots, 4 tableaux & fig.)

1931 **621 .33 (.42)**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 256.

SMITH (R. T.). — L'état actuel de **l'électrification** des chemins de fer en Grande-Bretagne. (6 600 mots.)

1931 **621 .33**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 269.

BACQUEYRISSE. — **L'emploi des moteurs compound en traction électrique** par courant continu et la **récupération d'énergie.** (30 000 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1931 **385 .6**

Bull. de l'Union intern. des ch. de fer, juin, p. 177.

Conventions et accords internationaux pour les transports par chemins de fer. (6 000 mots.) (A suivre.)

1931 656
Bull. de l'Union intern. des ch. de fer, juin, p. 184.
SHERRINGTON (C. E. R.). — La situation actuelle de l'aviation civile et ses rapports avec les chemins de fer. (12 500 mots.) (A suivre.)

1931 385 .113 (.497 .1)
Bull. de l'Union intern. des ch. de fer, juin, p. 200.
Les chemins de fer de l'Etat yougoslave pendant les exercices 1928 et 1929. (2 800 mots.)

1931 385 .113 (.43)
Bull. de l'Union intern. des ch. de fer, juin, p. 205.
La Compagnie des chemins de fer allemands pendant l'exercice 1930. (11 500 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1931 625 .232 (.494)
Bulletin technique de la Suisse romande, n° 16, 8 août, p. 204.
Les voitures Pullman en service entre Montreux-Zweisimmen-Interlaken. (900 mots & fig.)

Chronique des transports. (Paris.)

1931 656 .1 (.42) & 656 .2 (.42)
Chronique des transports, n° 14, 25 juillet, p. 5.
Le problème du rail et de la route en Angleterre. (3 700 mots.)

1931 621 .132 .8
Chronique des transports, n° 15, 10 août, p. 8.
Automobiles sur rails. (1 200 mots.)

Génie civil. (Paris.)

1931 621 .43 (.44)
Génie Civil, n° 2555, 1er août, p. 111.
DELANGHE (G.). — L'adaptation du bandage pneumatique aux automotrices ferroviaires (les Michelines). (5 000 mots & fig.)

1931 669
Génie Civil, n° 2555, 1er août, p. 121.
La chauffe électrique de la tête des lingots en vue de diminuer la retassure. (700 mots & fig.)

1931 625 .4 (.44)
Génie Civil, n° 2556, 8 août, p. 129.
OTTY (J.). — Le chemin de fer métropolitain de Paris. Etat actuel du réseau. Extensions en banlieue. Construction des lignes n° 8 et n° 9. (8 000 mots & fig.)

1931 621 .33 (06
Génie Civil, n° 2556, 8 août, p. 140.
Génie Civil, n° 2557, 15 août, p. 162.
VIe Session de la Conférence internationale des Grands Réseaux électriques à haute tension. (Paris, 18-27 juin 1931). (8 300 mots.) (A suivre.)

1931 621 .43
Génie Civil, n° 2556, 8 août, p. 146.
Les moteurs Diesel, leurs progrès et leurs tendances. (2 400 mots.)

1931 624 .5 (.73)
Génie Civil, n° 2557, 15 août, p. 157.
CAUFOURIER (P.) — Le pont suspendu de Fort Lee, de 1 067 m. 50 de portée. (4 000 mots & fig.)

1931 625 .245 (.43) & 625 .13 (.43)
Génie Civil, n° 2557, 15 août, p. 171.
Les appareils de mesure en service sur les Chemins de fer allemands, pour vérifier la résistance des ouvrages d'art. (800 mots.)

1931 621 .31 (.68)
Génie Civil, n° 2558, 22 août, p. 186.
Turbo-compresseur de 10 000 kw. de la centrale de Rosherville, près de Johannesbourg (Transval). (3 000 mots & fig.)

1931 385 .587
Génie Civil, n° 2558, 22 août, p. 189.
RAVISSE (G.). — Organisation scientifique du travail et rationalisation. (7 200 mots & fig.)

1931 621 .133
Génie Civil, n° 2558, 22 août, p. 196.
Economiseurs à tubes en acier à ailettes rapportées. (700 mots.)

La Science et la Vie. (Paris.)

1931 621 .132.8
La Science et la Vie, septembre, p. 217.
MARCHAND (J.). — Voici la locomotive de 1931. (5 000 mots & fig.)

1931 621 .8
La Science et la Vie, septembre, p. 243.
DONDI (F. C.). — Outillage géant pour chantiers géants. (4 500 mots & fig.)

1931 621 .132.8 (.44)
La Science et la Vie, septembre, p. 252.
MARCHAND (J.). — Le pneu ressuscitera-t-il le rail? (2 000 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1931 656 .1 & 656 .2
Les chemins de fer et les tramways, juillet, p. 132.
LE BESNERAIS. — La concurrence du rail et de la route. (17 000 mots.)

1931 621 .132.3 (.44)
Les chemins de fer et les tramways, juillet, p. 142.
Locomotive Pacific du chemin de fer Paris-Orléans. (1 000 mots & fig.)

1931 621 .132.3 (.42)
Les chemins de fer et les tramways, juillet, p. 143.
Locomotives à trois cylindres 1-3-0, du Southern Railway (Angleterre). (1 000 mots & fig.)

1931 625 .232 (.44)
Les chemins de fer et les tramways, juillet, p. 144.
Les voitures transatlantiques de l'Etat français. (1 000 mots.)

1931 656 .211.5 & 721 .9
Les chemins de fer et les tramways, juillet, p. 144.
Murs de quais démontables en béton armé. (1 000 mots & fig.)

1931 656 .212.5
Les chemins de fer et les tramways, juillet, p. 146.
Appareil d'accrochage pour installations de triage. (500 mots & fig.)

1931 625 .22
Les chemins de fer et les tramways, juillet, p. 146.
Voie ferrée permettant aux véhicules à grand empattement de se déplacer sur des rails fortement courbés. (1 000 mots & fig.)

1931 621 .133.4
Les chemins de fer et les tramways, juillet, p. 147.
Contre la projection des escarbilles par les cheminées. (500 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1931 656 (.73)
L'Ind. voies ferrées et transp. autom., juillet, p. 222.
L'évolution de l'industrie des transports en commun aux Etats-Unis. (6 500 mots & fig.)

Revue de l'Ecole polytechnique. (Bruxelles.)

1931 62. (01 & 669
Revue de l'Ecole polytechnique, avril, p. 295.
VERSÉ (G.). — **Résistance mécanique des métaux aux hautes températures.** (5 200 mots & fig.)

1931 69
Revue de l'Ecole polytechnique, avril, p. 311.
VANDEPERRE (L. J.). — **La construction moderne,** sa technique, son évolution, ses progrès. (8 000 mots.)

Revue générale des chemins de fer. (Paris.)

1931 625 .142.2
Revue générale des chemins de fer, août, p. 117.
LARTHOMAS (P.). — **L'injection Rüping à la créosote dans le cas des traverses** en pin maritime. (1 400 mots & 3 tableaux.)

1931 385 .587 (.44) & 625 .26 (.44)
Revue générale des chemins de fer, août, p. 122.
MORON. — L'emploi du **travail à la chaîne dans les ateliers du matériel roulant. Transformation sur le** matériel muni du frein continu des conduites hautes de frein en conduites moyennes. (800 mots & fig.)

1931 385 .113 (.44)
Revue générale des chemins de fer, août, p. 126.
Les **résultats de l'exploitation** des cinq grandes compagnies françaises de chemins de fer en 1930. (21 700 mots.)

1931 385. (09 (.65) & 385 .113 (.65)
Revue générale des chemins de fer, août, p. 161.
Le **réseau du Paris-Lyon-Méditerranée algérien.** (5 600 mots.)

1931 625 .143
Revue générale des chemins de fer, août, p. 172.
Quel est le rail le plus économique ? (150 mots.)

Revue politique et parlementaire. (Paris.)

1931 385. (09 (.44) & 385 .21 (.44)
Revue politique et parlementaire, 10 août, p. 319.
COLSON (C.). — Revue des **questions de transport.** (6 000 mots.)

Revue universelle des Mines. (Liége.)

1931 621 .116
Revue universelle des mines, 15 août, p. 92.
JADOT (J.). — Note sur le calcul des **sollicitations d'une tuyauterie** parcourue par un fluide incompressible en **régime permanent** ou en **régime varié.** (4 500 mots & fig.) (A suivre.)

1931 621 .9
Revue universelle des mines, 15 août, p. 99.
BODART (E.). — Les tendances actuelles en construction des **machines-outils.** (9 000 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1931 625 .4 & 621 .132.8
Die Lokomotive, Mai, S. 89.
Reibungslokomotiven für starke Steigungen. (1 800 Wörter & Abb.)

1931 621 .132.8
Die Lokomotive, Mai, S. 92.
MÜLLER. — **Die Turbinenlokomotive, Bauart Zoelly.** (1 400 Wörter & Abb.)

1931 621 .43 (.43)
Die Lokomotive, Juni, S. 109.
STAMM (O.). — **Motor-Kleinlokomotiven im Betrieb** der Deutschen Reichsbahn Gesellschaft. (4 200 Wörter & Abb.)

1931 621 .132.1
Die Lokomotive, Juni, S. 115.
Die letzten Lokomotiven aus der Maschinen-Fabrik **der** Staats-Eisenbahn-Gesellschaft. (2 300 Wörter & Abb.) (Fortsetzung folgt.)

1931 621 .132.4 (.436)
Die Lokomotive, Juni, S. 121.
C. Güterlokomotive Reihe 47 der österreichischen Bundesbahnen. (800 Wörter & Abb.)

1931 621 .132.1 (.71)
Die Lokomotive, Juli, S. 129.
Neuere Lokomotiven der Canadischen Pacific-Bahn. (3 600 Wörter & Abb.)

1931 385. (09 (.436)
Die Lokomotive, Juli, S. 134.
HILSCHER (V.). — **Lokomotiv-Geschichte** einiger kleiner österreichischer Eisenbahn-Verwaltungen. (3 000 Wörter & Abb.)

1931 656 .223 (.52)
Die Lokomotive, Juli, S. 141.
Fahrzeuge und ihre Leistung bei den japanischen Staatsbahnen. (2 200 Wörter.)

Elektrische Bahnen. (Berlin.)

1931 621 .33 & 625 .3
Elektrische Bahnen, Juliheft, S. 193.
TETZLAFF (H.). — Fragen des elektrischen Betriebes auf Steigungsstrecken. (5 000 Wörter.)

1931 621 .33
Elektrische Bahnen, Juliheft, S. 197.
STOCKAR (R. F.). — **Nutzbremsung** bei mit Einphasen-Wechselstrom betriebenen elektrischen Bahnen. (7 700 Wörter & Abb.)

1931 621 .331 (.431)
Elektrische Bahnen, Juliheft, S. 205.
RIEDEL (K.). — Die ferngesteuerten Gleichrichterwerke der Berliner Stadtschnellbahnen. (6 400 Wörter & Abb.)

1931 621 .332 (.433)
Elektrische Bahnen, Juliheft, S. 216.
TÄUBER (K.). — **Überströme und Netzschutz** im Fernleitungsnetz der Bahnstromversorgung in Bayern. (4 300 Wörter & Abb.)

1931 625 .62
Elektrische Bahnen, Augustheft, S. 232.
HINZE (A.). — Rechnerische Ermittlung des für die Fahrgäste **günstigsten Haltestellenabstandes** bei elektrisch betriebenen Verkehrsmitteln für Stadt- und Vorortverkehr. (10 500 Wörter & 5 Tabellen.)

1931 625 .255
Elektrische Bahnen, Augustheft, S. 247.
BADER (W.). — Theorie der Kurzschlussbremse. (6 000 Wörter & Abb.) (Fortsetzung folgt.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 621 .3
Elektrotechnische Zeitschrift, Heft 34, 20 August S. 1093.
SCHÜTTE (R.). — **Verlustleistung und Kühlluftbedarf** elektrischer Maschinen. (1 000 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1931 621 .4
Glasers Annalen, Nr. 1298, 15. Juli, S. 13.
LAUDAHN (W.). — **Schnellaufende** Dieselmotoren (3 000 Wörter & Abb.) (Fortsetzung folgt.)

1931 625 .21
Glasers Annalen, Nr. 1299, 1. August, S. 25.
POTTHOFF (H.). — **Eisenbahn-Zug- und Stossvorrichtungen.** (5 200 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1931 621 .335
Organ für die Fortschritte des Eisenbahnwesens, Heft 15, 1. August, S. 319.
SPIES (R.). — **Neuartige elektrische Versuchs-Eilgüterzuglokomotive.** (7 200 Wörter & Abb.)

1931 625 .144.4
Organ für die Fortschritte des Eisenbahnwesens, Heft 15, 1. August, S. 327.
WUPPERMANN (Th.). — Das « **Aufarbeiten** » von Schienen. (2 000 Wörter & Abb.)

1931 656 .282
Organ für die Fortschritte des Eisenbahnwesens, Heft 15, 1. August, S. 329.
LANGE (A.). — Der **entlaufene** Wagen. (3 500 Wörter & Abb.)

1931 625 .113
Organ für die Fortschritte des Eisenbahnwesens, Heft 16, 15. August, S. 337.
SCHRAMM (G.). — Allgemeine Theorie des **Nalenz-Höfer-Verfahrens.** (6 000 Wörter & Abb.)

1931 625 .14 (01
Organ für die Fortschritte des Eisenbahnwesens, Heft 16, 15. August, S. 346.
NEMESEK (J.). — **Über die Knicksicherheit** des **lückenlosen** Gleises. (2 100 Wörter & Abb.)

Reichsbahn (Berlin.)

1931 656 .23 (.43)
Reichsbahn, Nr. 24, S. 559.
KATTER. — Die **Tarifpolitik** der deutschen Reichsbahn. (9 1/2 Seiten.)

1931 385. (072 (.43)
..ichsbahn, Nr. 25, S. 583.
STUEBEL. — Einrichtung einer **bahneigenen Geeinsprüfstelle** und Prüfung von Gleisbettungsstoffen. Seiten. Tafeln & Abb.)

1931 651
..ichsbahn, Nr. 26, S. 604.
KAYSER. — Die Verwendung von Zählkassen im ..llnachweisverfahren. (2 Seiten & Abb.)

1931 625 .245 (.42) & 656 .225 (.42)
..eichsbahn, Nr. 27, S. 623.
BAUMANN. — **Behälterbeförderung und Kraftwagen-..rkehr** bei den britischen Bahnen. (14 Seiten, Karten Abb.)

Verkehrstechnische Woche. (Berlin.)

1931 656 .212.5
..erkehrstechnische Woche, Nr. 21, S. 277.
BECKER. — **Der einseitige** Rangierbahnhof für ..000 Wagen am Tag. (4 Seiten & Zeichn.)

1931 625 .245
..erkehrstechnische Woche, Nr. 22, S. 289.
TECKLENBURG. — **Wirtschaftliche Verwendung ..on Leig-Sonderwagen.** (5 Seiten.)

1931 656 .212.9 (.432)
..erkehrstechnische Woche, Nr. 23, S. 293.
GROMADECKI. — Die **Greiferseilpostanlage** für die ..xpressgutabfertigung im Hauptbahnhof Leipzig. (3 ..eiten & Abb.)

1931 625 .245 & 656 .225
..erkehrstechnische Woche, Nr. 23, S. 307.
SCHRÖDER. — **Fahrbare oder nichtfahrbare Gross-..nd Kleinbehälter.** (5 Seiten.)

1931 388 .9
..erkehrstechnische Woche, Nr. 24, S. 318.
EVERLING. — **Wege zur Wirtschaftlichkeit** im ..uftverkehr. (5 Seiten & Abb.)

1931 621 .132.8 & 656 .1
..erkehrstechnische Woche, Nr. 25, S. 329.
GEMBOECK. — Der Oberleitungsomnibus und seine ..**erwendungsmöglichkeit.** (6 Seiten & Abb.)

1931 656 .212.7
..erkehrstechnische Woche, Nr. 25, S. 335.
.. POESENTRUP. — **Ladebrücken und Laderampen.** ..2 Seiten & Abb.)

1931 385 .571 (.43)
..erkehrstechnische Woche, Nr. 26, S. 341.
WITTSCHELL. — Grundsätzliches zur **Berufsaus-..ildung der höheren technischen Beamten** und ein Vor-..chlag zur Neuordnung. (3 Seiten.)

1931 656 .212.5
Verkehrstechnische Woche, Nr. 26, S. 344.
AMMANN & RAAB. — Collineare Rechentafeln für die **Bestimmung von Zeit- und Geschwindigkeitsweglinien** ablaufender Eisenbahnfahrzeuge. (4 1/2 Seiten & Zeichn.)

1931 656 .2
Verkehrstechnische Woche, Nr. 27, S. 359.
GRENZEBACH. — **Verkehr und Luftverkehr.** (2 Seiten.)

1931 385
Verkehrstechnische Woche, Nr. 27, S. 383.
PIRATH. — Die Eisenbahnen in der **neuzeitlichen Verkehrswirtschaft.** (Nach einem Vortrag, gehalten auf dem 5. Gewerkschaftstag der Gewerkschaft deutscher Eisenbahner am 21. Juni 1931 in Stuttgart). (7 Seiten.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 651
Zeitschr. Ver. deutsch. Ing., Nr. 31, S. 985.
LIND (W.). — **Getriebe der Multipliziermaschinen.** (4 600 Wörter & Abb.)

1931 624 .2
Zeitschr. Ver. deutsch. Ing., Nr. 31, S. 997.
Schwingungsforschung. (2 900 Wörter.)

1931 625 .216
Zeitschr. Ver. deutsch. Ing., Nr. 32, S. 1013.
LANGER (P.) & THOME (W.). — **Dynamische Untersuchung** von Eisenbahnpuffern. (3 500 Wörter & Abb.)

1931 625 .245 & 656 .225
Zeitschr. Ver. deutsch. Ing., Nr. 32, S. 1038.
SCHRÖDER. — **Behälterverkehr.** (3 900 Wörter & Abb.)

1931 621 .43
Zeitschr. Ver. deutsch. Ing., Nr. 32, S. 1043.
SCHLAEFKE (K.). — Vorgänge beim **Verdichtungshub** von Vorkammer-Dieselmaschinen. (3 600 Wörter & Abb.)

1931 621
Zeitschr. Ver. deutsch. Ing., Nr. 34, 22. August, S. 1069.
RAUSCH (E.). — Richtige und fehlerhafte **Maschinengründungen.** Theoretische Grundlagen. (7 000 Wörter & Abb.)

1931 625 .172 (.493)
Zeitschr. Ver. deutsch. Ing., Nr. 34, 22. August, S. 1084.
Gerät zur Gleisuntersuchung. (700 Wörter & Abb.)

Zeitung des Vereins Deutscher Eisenbahnverwaltungen. (Berlin.)

1931 625 .143.4
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 22, S. 597.
BAESELER. — Der Schienenstoss als **Gelenk.** (10 Seiten & Zeichn.)

1931 385. (09 (.438)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 22, S. 607.

SERAPHIN. — **Das Eisenbahnwesen Polens.** (12 Seiten.)

1931 656 .212.5
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 23, S. 625.

MASUR. — Der **Rangierfunk** und sein betrieblicher Wert. (1 1/2 Seite.)

1931 656 .1 (.43) & 656 .2 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 23, S. 627.

KIENITZ. — Der **Schenkervertrag und die Zukunft** des Güter-Kraftverkehrs. (4 Seiten.)

1931 385 .2
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 24, S. 657.

LEIBBRAND. — **Eisenbahn und Wasserstrasse** vom Standpunkt der Leistungsfähigkeit und Wirtschaftlichkeit. (7 Seiten.)

1931 625 .112 & 625 .612
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 25, S. 686.

SIMON. — **Umsetzung** von Güterwagen zwischen Regelspur und Breitspur. (3 Seiten, Abb. & Karte.)

1931 656 .225 (.498)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 25, S. 700.

Erfahrungen mit den Stückgüterschnellzügen in Rumänien. (1 Seite & Diagr.)

1931 656 .223.2 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 26, S. 709.

BALLOF. — Die **Ausnutzung des Güterwagenparks** der Deutschen Reichsbahn im Jahre 1929. (7 Seiten & Diagr.)

1931 385 .63 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 26, S. 719.

EGER. — Die Auslegung der **Vorschriften über offene Wagen** im I. UE. G. (1 Seite.)

1931 621 .33 (09
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 27, S. 737.

SCHIEB. — Zum **50-jährigen Bestehen** der elektrischen Eisenbahnen. (6 Seiten, Abb. & Karte.)

1931 656 .256
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 28, S. 768.

GLAESEL. — Die Frage der **Übertragung** bei der Zugbeeinflussung. (2 Seiten.)

1931 385. (09 (.42)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 28, S. 776.

Die **englischen Eisenbahnen** im Jahre 1930. (2 1/2 Seiten.)

In English.

Bulletin, American Railway Engineering Association. (Chicago.)

1931 625 .1 (06 (.73
Bull. Amer. Ry. Eng. Ass^on^, June, p. 1.

Proceedings of the thirty-second annual convention American Railway Engineering Association, Chicago, March 10 and 11. (25 800 words.)

1931 625 .142.2 (.73) & 625 .173 (.73
Bull. Amer. Ry. Eng. Ass^on^, June, p. 49.

BURTON (W. J.). — **Tie renewals** as affected by the use of longer lived ties. (2 400 words & 5 tables.)

1931 625 .113 & 656 .22
Bull. Amer. Ry. Eng. Ass^on^, June, p. 65.

CAMPBELL (J. L.). — A method for finding cost of **work done in moving trains against rolling, curve, and rise and fall resistances.** (3 000 words.)

Electric Railway Journal. (New York.)

1931 625 .143.3 (.73)
Electric Railway Journal, August, p. 414.

GEORGE (H. H.). — **Flange and tread wear** on open-point mates. (900 words & fig.)

1931 621 .31 (.73)
Electric Railway Journal, August, p. 416.

BRACKETT (R. D.). — **Mercury rectifier substation** operates on 25 or 60 cycles. (1 200 words & fig.)

Engineer. (London.)

1931 385. (01 (.6)
Engineer, No. 3943, 7 August, p. 139.

The Trans-Saharan Railway. (500 words.)

1931 621 .335. (.593) & 621 .43 (.593)
Engineer, No. 3943, 7 August, p. 151.

Oil-electric locomotives for Siam. (1 700 words & fig.)

1931 625 .26 & 665 .882
Engineer, No. 3944, 14 August, p. 168.

EYLES (A. J. T.). — **Repairing all-metal railway coaches by welding.** (1 200 words.)

1931 621 .132.6 (.42)
Engineer, No. 3944, 14 August, p. 178.

London & North Eastern Railway **tank engine.** (200 words & fig.)

1931 621 .31
Engineer, No. 3945, 21 August, p. 203.

An **automatic regulator.** (2 700 words & fig.)

Engineering. (London.)

1931 62. (01
ngineering, No. 3420, 31 July, p. 131.
Machine for the mechanical testing of insulators. 200 words & fig.)

1931 621 .1
ngineering, No. 3420, 31 July, p. 143.
JAKOB (M.). — **Steam research in Europe and in merica.** — First of a course of four lectures delivered May, 1931, before the University of London. (700 ords.)

1931 625 .4 (.73)
ngineering, No. 3421, 7 August, p. 158.
SKINNER (F. W.). — New York **electric subway** nstruction methods. — V. (4 800 words & fig.)

1931 621 .43 (.82)
ngineering, No. 3421, 7 August, p. 164.
Metre-gauge **rail coach chassis** for the Argentine ransandine Railway. (1 000 words & fig.)

1931 62. (01 & 693
ngineering, No. 3421, 7 August, p. 181.
Stresses in reinforced concrete. (3 300 words.)

1931 621 .392 (.42)
ngineering, No. 3421, 7 August, p. 183.
The single-operator **welding generator.** (1 100 words.)

1931 656 .212.6 (.42)
ngineering, No. 3422, 14 August, p. 196.
The « Norfolk » **spade for discharging slack coal.** 000 words & fig.)

1931 62. (01 & 669 .1
ngineering, No. 3422, 14 August, p. 203.
The **yield point and creep limit of steel** at high mperatures. (2 500 words & 2 tables.)

1931 669 .1 & 624 .51
ngineering, No. 3422, 14 August, p. 204.
The properties of cold drawn **bridge wires.** (1 000 ords & fig.)

1931 621 .132.6 (.42)
ngineering, No. 3422, 14 August, p. 208.
GRESLEY (H. N.). — **Tank locomotives** on the ndon and North Eastern Railway. (400 words & fig.)

1931 621 .132.8 (.73)
ngineering, No. 3422, 14 August, p. 226.
2-10-4 type **freight locomotives** for the Chesapeake d Ohio Railroad. (1 600 words & 2 tables.)

1931 625 .13 (.42)
ngineering, No. 3422, 14 August, p. 237.
Cementation work on the Severn tunnel. (700 words fig.)

1931 621 .118
ngineering, No. 3422, 14 August, p. 241.
Boiler failures and their causes. (2 900 words.)

1931 625 .232 (.42)
Engineering, No. 3422, 7 August, p. 244.
Third class non-convertible **sleeping cars** on the London & North Eastern Railway. (400 words & fig.)

Engineering News-Record. (New York.)

1931 625 .122 & 625 .123
Engineering News-Record, No. 4, 23 July, p. 129.
DUFFIE (A. D.) — **Railroad fill** across swamp confined by **steel sheeting.** (600 words & fig.)

1931 693
Engineering News-Record, No. 4, 23 July, p. 130.
CARLSON (E. T.) & BATES (P. H.). — Can cement **durability** be predicted? (3 200 words.)

1931 625 .4 (.73)
Engineering News-Record, No. 5, 30 July, p. 140.
ROGERS (L. C.). — **Rapid Transit Lines' subway** into Cleveland Union Terminal built under busy street. (2 800 words & fig.)

1931 624 .9 (.73)
Engineering News-Record, No. 5, 30 July, p. 177.
MOSES (J. C.). — **Demolition of trainshed** at South Station, Boston. (1 400 words & fig.)

1931 693
Engineering News-Record, No. 6, 6 August, p. 207.
GUNZBURG (A. M.). — **Frozen concrete** used in Russian buildings. (800 words.)

1931 624 .63 (.81)
Engineering News-Record, No. 6, 6 August, p. 208.
SCHJODT (R.). — Long **rigid-frame bridge** erected by cantilever method. (800 words & fig.)

1931 625 .143.2 (.71 + .73)
Engineering News-Record, No. 6, 6 August, p. 221.
Steel rail developments. (900 words.)

1931 624 .2
Engineering News-Record, No. 7, 13 August, p. 244.
YOUNG (D.). — **The Vierendeel truss.** A review of its development and possibilities. (1 400 words & fig.)

1931 624 .2 (.73)
Engineering News-Record, No. 7, 13 August, p. 257.
Suspended girders used to avoid pier between railroad tracks. (600 words & fig.)

1931 625 .111 (.73)
Engineering News-Record, No. 8, 20 August, p. 284.
Grade-separation problems and structures at Columbus, Ohio. (5 000 words & fig.)

1931 625 .144 .425 (.4) & 625 .173 (.4)
Engineering News-Record, No. 8, 20 August, p. 295.
Track renewal by rail-length units in Europe. (1 600 words & fig.)

1931 624 .52 (.42)
Engineering News-Record, No. 8, 20 August, p. 300.
Through-cantilever bridge of concrete built in Scotland. (900 words & fig.)

Institution of Engineers, Australia. (Sydney.)

1931 621 .4 (.944) & 625 .13 (.944)
Institution of Engineers, Australia, June, p. 206.
HUMPHRIES (A. H. D.). — Flat top and special tunnel construction, City of Sydney Underground Railway. (10 000 words & fig.)

Journal of the Institute of Transport. (London.)

1931 38 (.73)
Journal of the Institute of Transport, July, p. 418.
The changing conditions of transportation and commerce in the United States of America. (10 300 words & fig.)

1931 385 .21 (.42)
Journal of the Institute of Transport, July, p. 440.
ABBOTT (T.). — Canals and inland waterways. (3 200 words.)

1931 388
Journal of the Institute of Transport, July, p. 444.
SEMENZA (M.). — Problems of public transportation and town planning in Milan and its environs. (8 000 words & fig.)

1931 385 (.82)
Journal of the Institute of Transport, July, p. 457.
ROBERTS (C. A.). — Argentine and River Plate centre. The relationship between the economical development of Argentina and its railways. (5 000 words)

Mechanical Engineering. (New York.)

1931 621. (06 (00)
Mechanical Engineering, August, p. 575.
GAILLARD (J.). — An international system of fits. (10 000 words & fig.)

1931 65
Mechanical Engineering, August, p. 599.
JORDAN (J. P.). — The scope of management in our future business development. (7 800 words.)

1931 621 .165
Mechanical Engineering, August, p. 605.
Post-war land-turbine development. — A British point of view. (5 600 words & fig.)

Modern Transport. (London.)

1931 621 .335 (.593) & 621 .43 (.593)
Modern Transport, No. 647, 8 August, p. 3.
Diesel-electric locomotives for Siam. (1 600 words & fig.)

1931 656 .211.4 (.93
Modern Transport, No. 647, 8 August, p. 5.
New terminal station for Auckland. (1 200 wor & fig.)

1931 625 .156 (.4
Modern Transport, No. 648, 15 August, p. 3.
New-type buffer stop installed at Euston. (800 wor & fig.)

1931 621 .132.6 (.4
Modern Transport, No. 648, 15 August, p. 5.
Locomotive conversion on the London & Nort Eastern Railway. (400 words & fig.)

1931 625 .2
Modern Transport, No. 648, 15 August, p. 6.
Freight trains on heavy gradients. (1 000 wor & fig.)

1931 385 (.43
Modern Transport, No. 648, 15 August, p. 7.
The railway position in Germany. (1 700 word & fig.)

1931 656 .235 (.42
Modern Transport, No. 648, 15 August, p. 8, No. 9, 22 August, p. 3.
Industrial traffic management. (2 800 words.)

1931 625 .232 (.42
Modern Transport, No. 648, 15 August, p. 10.
Third class sleeping cars for London & North Eastern Railway. (500 words & fig.)

1931 656 .1 (.43
Modern Transport, No. 648, 15 August, p. 16.
Road transport in Germany. (1 000 words.)

1931 656 .1 (.42)
Modern Transport, No. 648, 15 August, p. 17.
Transport and the highway. — No. 9. Further legislation of the nineteenth century. (1 800 words.)

1931 656 .211.4 (.44) & 725 .31 (.44)
Modern Transport, No. 9, 22 August, p. 3.
Reconstruction of the Gare de l'Est. (3 000 words & fig.)

1931 625 .14 & 656 .222 .1
Modern Transport, No. 9, 22 August, p. 7.
Speed on railways. — The permanent way aspect. (1 900 words.)

1931 625 .232 (.42)
Modern Transport, No. 9, 22 August, p. 8.
The London Midland & Scottish Railway Royal train. (1 400 words.)

1931 385. (498)
Modern Transport, No. 9, 22 August, p. 11.
Transport developments in Rumania. (1 900 words.)

Railway Age. (New York.)

1931 651 (.73)
ilway Age, No. 4, 25 July, p. 120.
Cut costs with motor coaches. (2 500 words & fig.)

1931 624 .32 (.73)
ilway Age, No. 4, 25 July, p. 123.
Bridging the Atchafalaya under difficulties. (3 900 rds & fig.)

1931 621 .13 (0
ilway Age, No. 4, 25 July, p. 129.
KUHLER (O.). — Making steam locomotives beau- ul. (2 100 words & fig.)

1931 614 .8 (.73)
ilway Age, No. 4, 25 July, p. 139.
MILHOLLAND (E. V.). — First aid to the injured; nerican railroad practice. (1 500 words & fig.)

1931 656 .1 (.73)
ilway Age, No. 4, 25 July, p. 141.
YOUNG (L. B.). — Freight traffic shows steady in- ease. (4 000 words & fig.)

1931 656 .1 (.73)
ilway Age, No. 4, 25 July, p. 144.
Million dollars saved by motor coach substitution. 500 words & fig.)

1931 625 .258 (.73)
ilway Age, No. 5, 1 August, p. 160.
Car retarders accomplish definite savings in yard eration. (2 800 words & fig.)

1931 624 .8 (.73)
ilway Age, No. 5, 1 August, p. 164.
Special features used in new lift-span bridges. 200 words & fig.)

1931 621 .139 (.73) & 625 .27 (.73)
ilway Age, No. 5, 1 August, p. 168.
Norfolk & Western yields ideas in stores work. 000 words & fig.)

1931 621 .132.5 (.73)
ilway Age, No. 5, 1 August, p. 169.
Locomotive designed for service on the Canadian airies. (2 800 words & fig.)

1931 621 .133.1 & 656 .2
ilway Age, No. 5, 1 August, p. 174.
Problems of the superintendent. — Part IV; Fuel rformance and dispatchers' qualifications considered recent convention of the American Association of ilroad Superintendents. (4 200 words.)

1931 656 .1
ilway Age, No. 5, 1 August, p. 177.
STRAWN (S. H.). — Interests of carriers and ship- rs are inseparable. (3 200 words & fig.)

1931 385 .3 (.73)
ilway Age, No. 5, 1 August, p. 181.
Interstate Commerce Commission digs deeper as ciprocity hearings near close. (7 200 words.)

1931 651 (.73) & 656 .237 (.73)
Railway Age, No. 5, 1 August, p. 199.
WALLACE (J. C.). — Centralized machine accounting for better records, lower costs. — Operating economy series. (3 500 words.)

1931 625 .231 (.73)
Railway Age, No. 5, 1 August, p. 203.
Reading builds 20 steel cabooses. (700 words & fig.)

1931 625 .143 (.73)
Railway Age, No. 5, 1 August, p. 205.
SKILLMAN (T. J.). — Pennsylvania adopts 152-lb. rail. (1 600 words & fig.)

1931 656 .1 & 656 .261
Railway Age, No. 5, 1 August, p. 207.
POWELL (G. A.). — Increasing less than carload freight traffic. (2 500 words.)

1931 625 .242 (.73)
Railway Age, No. 5, 1 August, p. 211.
Revenue hopper cars made equally adapted for ballast work. (1 400 words & fig.)

1931 625 .26 (.73)
Railway Age, No. 7, 15 August, p. 237.
Operating economy series. Coach-yard facilities pay big return. (2 100 words & fig.)

1931 625 .111 (.73)
Railway Age, No. 7, 15 August, p. 241.
Busiest railway crossing is no more. (4 000 words & fig.)

1931 621 .335 (.73) & 621 .43 (.73)
Railway Age, No. 7, 15 August, p. 245.
Santa Fe gets fourteen new gas-electric cars. (1 400 words & fig.)

1931 656 .222.6 (.73)
Railway Age, No. 7, 15 August, p. 247.
SPERRY (H. M.). — Improvement in freight train performance by 47 Roads. (2 800 words & 3 tables.)

1931 656 (06 (.73)
Railway Age, No. 7, 15 August, p. 253.
The Division Superintendent a man of diversified duties. (6 300 words.)

Railway Engineer. (London.)

1931 621 .131 .3 (.42)
Railway Engineer, September, p. 326.
Locomotive experimental stations. (700 words.)

1931 625 .143.2
Railway Engineer, September, p. 326.
Rail steel developments. (900 words.)

1931 621 .132.3
Railway Engineer, September, p. 327.
Pacific type locomotives. (1 200 words).

1931 **625 .13 (.42)**
Railway Engineer, September, p. 329.
CARPMAEL (R.). — **Cementation in the Severn tunnel,** Great Western Railway. (2 800 words & fig.)

1931 **621 .33 (.497)**
Railway Engineer, September, p. 332.
Swiss **railway electrification** progress. (900 words.)

1931 **624. (0**
Railway Engineer, September, p. 333.
A new series of **bridge tests.** (1 700 words.)

1931 **621 .131.3**
Railway Engineer, September, p. 334.
Locomotive experimental stations. — Abstract of a paper read by Mr. H. N. Gresley, C. B. E., before the Institution of Mechanical Engineers at Cambridge, on July 14, 1931. (2 100 words & fig.)

1931 **625 .232 (.42)**
Railway Engineer, September, p. 336.
All-steel **Pullman cars** for Southern Railway services. (1 800 words & fig.)

1931 **625 .26 (.42)**
Railway Engineer, September, p. 338.
A notable railway **rolling stock equipment works.** (4 000 words & fig.)

1931 **691**
Railway Engineer, September, p. 347.
Timber preservation. — Some notes on the work of the British Wood Preserving Association. (600 words & fig.)

1931 **621 .132.3 (.73)**
Railway Engineer, September, p. 349.
POULTNEY (E. C.) New **Pacific type locomotives, Pennsylvania Railroad.** (4 800 words, 2 tables.)

1931 **621 .135.3 & 625 .13**
Railway Engineer, September, p. 354.
KOURIAN (Kh.). — **Spring calculations** from first principles. — I. (2 300 words & fig.)

1931 **621 .95 (.42)**
Railway Engineer, September, p. 356.
Machine tools for railway workshops. (1 600 words.)

1931 **625 .142.3**
Railway Engineer, September, p. 357.
Steel sleepers for chaired track. (3 600 words.)

1931 **51. (08**
Railway Engineer, September, p. 359.
JACKSON (P. H.). — **Tables of trigonometrical functions of switch angles.** (1 800 words.)

Railway Engineering and Maintenance. (Chicago.)

1931 **625 .144.4 (.73)**
Railway Engineering and Maintenance, August, p. 712.
Effective **oiling equipment** used on Boston & Maine. (2 700 words & fig.)

1931 **621 .133.7 (.73) & 725 .33 (.73**
Railway Engineering and Maintenance, August, p. 71
Zeolite plants effect economies. (3 500 words & fig.

1931 **614 .8 (.73**
Railway Engineering and Maintenance, August, p. 71
BOOTS (E. W.). — **Eliminating accidents among bridge and building department men.** (2 700 word & fig.)

1931 **625 .144.4 (.73**
Railway Engineering and Maintenance, August, p. 72
New uses indicate broader field for **tractors.** (2 70 words & fig.)

1931 **656 .222.**
Railway Engineering and Maintenance, August, p. 72
Diagrams used for speed tests. (900 words & fig.)

1931 **625 .144.2 (.73)**
Railway Engineering and Maintenance, August, p. 727
HIGGINS (C. H.). — **A special rod for setting string-line stakes.** (1 500 words & fig.)

Railway Gazette. (London.)

1931 **625 .232 (.71)**
Railway Gazette, No. 3, 17 July, p. 73.
New Canadian National Railways **lounge cars.** (700 words & fig.)

1931 **625 .232 (.494)**
Railway Gazette, No. 3, 17 July, p. 75.
New **dining cars,** Swiss Federal Railways. (200 words & fig.)

1931 **625 .154 (.42)**
Railway Gazette, No. 3, 17 July, p. 77.
A new type of **locomotive turntable.** (1 100 words & fig.)

1931 **621 .132.6 (.42)**
Railway Gazette, No. 3, 17 July, p. 78.
New **2-6-2 tank locomotives,** Great Western Railway. (300 words & fig.)

1931 **385 .4 (.42)**
Railway Gazette, No. 3, 17 July, p. 83.
Commercial Department reorganisation, London Midland & Scottish Railway. (1 500 words.)

1931 **656 .23**
Railway Gazette, No. 4, 24 July, p. 105.
CAWTHRA (H.). — **Passenger fares** and the Railway Commission. (1 400 words.)

1931 **385 .15 (.44)**
Railway Gazette, No. 4, 24 July, p. 106.
DONALD (Sir R.). — **Relationship of the State to Railways in France.** (2 800 words.)

1931 **621 .33 (.54)**
Railway Gazette, No. 4, 24 July, p. 108.
South Indian Railway. — Madras suburban **electrification.** (1 000 words & fig.)

1931 621 .95 (.42)
ilway Gazette, No. 4, 24 July, p. 111.
Automatic locomotive tyre boring at Swindon works, eat Western Railway. (2 800 words & fig.)

1931 621 .232 (.42)
ilway Gazette, No. 4, 24 July, p. 115.
New bogie saloons, Southern Railway. (500 words.)

1931 621 .335 (.593) & 621 .43 (.593)
ilway Gazette, No. 4, 24 July, p. 115.
Diesel-electric locomotives for Siam. (1 000 words fig.)

1931 621 .132.8 (.67)
ilway Gazette, No. 4, 24 July, p. 117.
New Beyer-Garratt locomotives for the Tanganyika ilways. (1 000 words & fig.)

1931 656 .255
ilway Gazette, No. 5, 31 July, p. 137.
Centralised traffic control. (1 700 words & fig.)

931 621 .132.1 & 621 .43
ilway Gazette, No. 5, 31 July, p. 139.
A new Diesel locomotive development. (900 words fig.)

1931 621 .43
ilway Gazette, No. 5, 31 July, p. 140.
« Hardy » rail car chassis, Argentine Transandine ilway. (500 words & fig.)

931 621 .132.8 (.73)
ilway Gazette, No. 5, 31 July, p. 141.
New Mallet locomotives for the Baltimore & Ohio lroad. (300 words & fig.)

931 621 .43
ilway Gazette, No. 5, 31 July, p. 142.
Tests of petrol rail cars with pneumatic tyres. (700 rds & fig.)

931 656 .1 (.67)
ilway Gazette, No. 5, 31 July, p. 144.
A motor service in Uganda. (900 words & fig.)

931 625 .173 (.44)
ilway Gazette, No. 6, 7 August, p. 169.
French permanent way renewal methods. (1 000 rds & fig.)

931 656 .257 (.42)
ilway Gazette, No. 6, 7 August, p. 171.
New audit offices for London & North Eastern Rail- y (Southern area) Divisional accountant's staff. 00 words & fig.)

931 621 .335 (.593) & 621 .43 (.593)
ilway Gazette, No. 6, 7 August, p. 181.
New Diesel-electric locomotives for Siam. (1 400 rds.)

1931 656 .29
Railway Gazette, No. 7, 14 August, p. 201.
LUCK (S. I.). — Utilisation of railway bridge sites. (1 100 words & fig.)

1931 385 .1 (.42) & 621 .33 (.42)
Railway Gazette, No. 7, 14 August, p. 202.
Railway electrification. (2 200 words.)

1931 625 .172 (.42)
Railway Gazette, No. 7, 14 August, p. 203.
Track irregularities and carriage suspension. (400 words & fig.)

1931 621 .132.8
Railway Gazette, No. 7, 14 August, p. 204.
The scope of the steam rail car. (2.000 words & fig.)

1931 625 .26 (.42)
Railway Gazette, No. 7, 14 August, p. 207.
Reorganisation of carriage repair works, Lancing, Southern Railway. (2 100 words & fig.)

1931 625 .232 (.42)
Railway Gazette, No. 7, 14 August, p. 211.
New third-class sleeping cars, London & North Eastern Railway. (400 words & fig.)

1931 621 .132.6 (.42)
Railway Gazette, No. 7, 14 August, p. 213.
An interesting locomotive conversion. (500 words.)

1931 38 & 656
Railway Gazette, No. 8, 21 August, p. 234.
BARTON (R.). — Railway problems and the International Chamber of Commerce. (1 600 words.)

1931 621 .13 (0
Railway Gazette, No. 8, 21 August, p. 235.
The locomotive on the railroads' battlefield. (3 200 words & fig.)

1931 621 .138.1 (.42) & 725 .33 (.42)
Railway Gazette, No. 8, 21 August, p. 239.
New locomotive depot at Ashford, Kent, Southern Railway. (1 600 words.)

1931 625 .143 (.73)
Railway Gazette, No. 8, 21 August, p. 244.
SKILLMAN (T. J.) — New 152-lb. flat-bottomed rails, Pennsylvania Railroad. (1 200 words & fig.)

1931 621 .194 (.42)
Railway Gazette, No. 8, 21 August, p. 246.
Machine tools for railway workshops. (800 words & fig.)

Railway Magazine. (London.)

1931 656 .222.1 (.44)
Railway Magazine, September, p. 165.
ALLEN (C.). — British locomotive practice and performance. (5 200 words & fig.)

1931 656 .222.1 (.44)
Railway Magazine, September, p. 185.
Modern locomotive work in France. (6 400 words & fig.)

Railway Mechanical Engineer. (New York.)

1931 385. (061.4 & 621 (06 (.73)
Railway Mechanical Engineer, July, p. 349.
Twelfth Meeting of Mechanical Division, A. R. A., held at Chicago. (20 000 words & fig.)

1931 621 .132.8 (.43)
Railway Mechanical Engineer, July, p. 367.
German rail car with novel drive. (500 words & fig.)

1931 621 .132.3 (.73) & 621 .132.5 (.73)
Railway Mechanical Engineer, August, p. 397.
Four test locomotives for the Baltimore & Ohio. (4 000 words & fig.)

1931 625 .242 (.73) & 625 .246 (.73)
Railway Mechanical Engineer, August, p. 404.
Chicago Great Western all-welded hoppers built by Pullman. (3 500 words & fig.)

1931 621 .138.5 (.73)
Railway Mechanical Engineer, August, p. 408.
Shopping Union Pacific locomotives. (2 300 words & fig.)

1931 621 .135.2 & 625 .214
Railway Mechanical Engineer, August, p. 410.
WILLHOFFT (F. O.). — Fluid-film lubrication as applied to journal bearings. (2 200 words & fig.)

1931 625 .242 (.73) & 625 .246 (.73)
Railway Mechanical Engineer, August, p. 412.
Revenue hopper cars can be used for ballast distribution. (1 500 words & fig.)

Railway Signaling. (Chicago.)

1931 656 .257 (.73)
Railway Signaling, August, p. 265.
Indianapolis Union Station installs electro-pneumatic interlocking. (2 800 words & fig.)

1931 656 .257 (.73)
Railway Signaling, August, p. 269.
The Mott Haven interlocking. (3 500 words & fig.)

1931 656 .257 (.73)
Railway Signaling, August, p. 273.
Erie increases track capacity on busy section of double track. (2 800 words & fig.)

1931 656 .25
Railway Signaling, August, p. 276.
JONES (C. L.). — Lightning on signal power lines. (4 200 words & fig.)

1931 656 .257 (.73
Railway Signaling, August, p. 280.
New interlocking for the St. Louis municipal bridg
(2 000 words & fig.)

1931 656. 253 (.42
Railway Signaling, August, p. 283.
MORKHILL (R. F.). — Metropolitan Railway o London resignaling with modern equipment. (1 40 words & fig.)

South African Railways and Harbours Magazine (Johannesburg.)

1931 625 .26 (.68
South African Rys. & Harbours Mag., July, p. 950.
Speeding up coaching stock construction. (1 000 words & fig.)

In Spanish.

Revista de Obras Públicas. (Madrid.)

1931 62. (01 & 721 .
Revista de Obras Públicas, nº 15, 1º de agosto, p. 305.
CORDOBES (J. G.). — Determinación del momento de inercia de una sección circular maciza de hormigón armado. (600 palabras.)

1931 621 .33 (.460)
Revista de Obras Públicas, nº 15, 1º de agosto, p. 306.
GARCIA LOMAS (J.). — Las recientes electrificacionès de la Compañia de los caminos de hierro del Norte de España. (9 600 palabras & fig.)

1931 621 .33 (.460)
Revista de Obras Públicas, nº 16, 15 de agosto, p. 338.
GARCIA-LOMAS (J.). — Las recientes electrificacionès de la Compañia de los caminos de hierro del Norte de España. (5 400 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1931 642 .2
Annali dei lavori pubblici, giugno, p. 529.
NICOLOSI (G.). — Grandi travi a T di cemento armato, inflesse. (6 300 parole & fig.)

L'Ingegnere. (Roma.)

1931 624 .61 (.45)
L'Ingegnere, luglio, p. 459.
Circa il nuovo ponte sul Tevere a monte di Ponte Milvio. (1 200 parole & fig.)

Notiziario tecnico. (Firenze.)

1931 621 .132.8 (.43) & 621 .43 (.45)

otiziario tecnico, agosto, p. 207.

Automotrici Diesel-elettriche dei gruppi Ne 84 — Ne 89. (2 400 parole & fig.)

---

ivista tecnica delle ferrovie italiane. (Roma.)

1931 624 .61 (.45)

vista tecnica delle ferrovie italiane, 15 luglio-15 agosto, p. 1.

BUSINARI (F.). — Il nuovo **viadotto** di Castellaneta lla linea Bari-Taranto. (5 800 parole & fig.)

1931 621 .335 (.45)

vista tecnica delle ferrovie italiane, 15 luglio-15 agosto, p. 11.

BIANCHI (G.) & ELENA (S.). — **Descrizione delle comotive trifasi,** gruppo E 554 ed E 432. (7 700 parole fig.)

1931 62. (01 (.45) & 694 (.45)

vista tecnica delle ferrovie italiane, 15 luglio-15 agosto, p. 52.

PERFETTI (A.). — Le **prove meccaniche** sui legna-i e le norme regolamentari di accettazione. (2 000 role & 7 quadri.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 656 .225 (.92)

Ingenieur, nr 31, 31 Juli, p. 67.

RADERSMA (J.). — Het **transport** bij het groot ndbouwbedrijf in de Tropen. (6 000 woorden, 2 tafe-elen & fig.)

1931 621 .33 (.42)

Ingenieur, nr 31, 31 Juli, p. 73.

VERSCHOOR (H. E.). — Onderzoek naar **electrifi-tie** der spoorwegen in Engeland. (900 woorden.)

1931 621 .33 (.492) & 621 .335 (.492)

Ingenieur, nr 33, 14 Augustus, p. 75.

Electrificatie van de spoorwegen Amsterdam-Alk-aar en Velsen-Uitgeest.

I. — VAN LESSEN (H. J.). — De **elektrische in-htingen** en het bedrijf. (9 800 woorden, 3 tafereelen fig.); II. — BOLLEMAN KIJLSTRA (E.). — Het **ektrische materieel.** (3 000 woorden & fig.); III. — HELLING (H. G. J.). — **Stations** en onderstations. 500 woorden & fig.)

1931 625 .245 (.43)

Ingenieur, nr 33, 14 Augustus, p. 113.

Goederenwagens voor het vervoer van graan bij de itsche Spoorwegen. (800 woorden.)

Spoor- en Tramwegen. (Utrecht.)

1931 625 .14 (01

Spoor- en Tramwegen, nr 3, 4 Augustus, p. 53; nr 4, 18 Augustus, p. 85.

DRIESSEN (Ch. H. J.). — De **berekening van den bovenbouw.** (5 800 woorden & fig.)

1931 621 .132.1 (.492)

Spoor- en Tramwegen, nr 3, 4 Augustus, p. 59; nr 4, 18 Augustus, p. 82.

LABRIJN (P.). — Eenige nieuwe details bij de **nieuwere locomotiven** der Nederlandsche Spoorwegen. (3 000 woorden & fig.) (Slot volgt.)

1931 55 (.492) & 625 .122 (.492)

Spoor- en Tramwegen, nr 3, 4 Augustus, p. 62; nr 4, 18 Augustus, p. 88.

JONGMANS (W. J.). — **Geologische onderzoekingen** voor de Nederlandsche Spoorwegen in Limburg in verband met **bodemafschuivingen.** (3 500 woorden & fig.) (Wordt vervolgd.)

1931 621 .33

Spoor- en Tramwegen, nr 4, 18 Augustus, p. 91.

VAN LESSEN (H. J.). — Beschouwing over de **kosten van extra treinen op geëlectrificeerde baan-vakken.** (1 500 woorden.)

In Polish.

INŻYNIER KOLEJOWY. (Warszawa).

1931 621 .33 (438) = 92 .885

Inzynier Kolejowy, 1 Sierpnia, st. 227.

PODOSKI (J.). — **Electrification du nœud de chemin** de fer à Varsovie. (4 200 mots, 3 tableaux & fig.)

1931 621 .133.1 (.4) = 91 .885

Inzynier Kolejowy, 1 Sierpnia, st. 232.

SIPPKO (G.). — Les **chemins de fer et la houille pendant la grande guerre.** (4 800 mots & fig.)

1931 624 .7 (.438) = 91 .885

Inzynier Kolejowy, 1 Sierpnia, st. 238.

SZUPP (B.). — **Viaduc en béton armé** près de la station Lipowa sur la ligne Bydgoszcz-Gdynia. (4 000 mots, 3 tableaux & fig.)

1931 385 .1 (.4) = 91 .885

Inzynier Kolejowy, 1 Sierpnia, st. 242.

Aperçu sur les **résultats de l'économie des chemins de fer européens en 1931.** (4 200 mots.)

In Portuguese.

Gazeta dos Caminhos de ferro. (Lisboa.)

1931 385. (09 (.469)

Gazeta dos Caminhos de Ferro, nº 1047, 1 de Agosto, p. 322.

TORRES (C. M.). — **O caminho de ferro em Portugal.** (900 palavras). (Continuação.)

1931 625 .1 (.469)

Gazetas dos Caminhos de Ferro, nº 1048, 16 de Agosto, p. 346.

ORNELLAS (C. d'). — Companhia dos caminhos de ferro do Norte de Portugal. **A linha da Senhora da Hora á Trofa — As suas novas locomotivas.** (1 100 palavras.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1931 621 .132.8 (.81)

Revista das Estradas de ferro, nº 145, 30 de Julho, p. 317.

O emprego de automotrizes na Australia. (2 400 palavras & fig.)

1931 385. (09

Revista das Estradas de ferro, nº 145, 30 de Julho, p. 325.

Um seculo de tracção ferroviaria e a electricidade. (2 000 palavras & fig.)

In Rumanian.

(= 599)

Revista C. F. R. (Bucuresti.)

1931 385 .21 (.498) = 599

Revista C. F. R., nº 6, p. 161.

CIORICEANU. — **L'évolution des transports par rail et par eau en Roumanie d'avant-guerre.** (5 pages.)

In Serbian.

(= 91.882)

Saobračajni pregled. (Beograd.)

1931 621 .132.1 (.497.1) = 91 .882

Saobracajni pregled, nº 6, p. 221.

GREBENAROVIC. — **Les nouvelles locomotives des** Chemins de fer de l'Etat yougoslave. (12 500 mots.)

1931 656 .225 = 91 .882

Saobracajni pregled, nº 6, p. 235, nº 7, p. 269.

SCEGLOVITOV. — **L'efficacité des trains lourds de marchandises.** (9 000 mots & fig.)

1931 627 (.497.1) = 91 .882

Saobracajni pregled, nº 6, p. 260.

LUCIC. — **Les ports et la navigation maritime.** (3 000 mots.)

1931 625 .251 = 91 .882

Saobracajni pregled, nº 6, p. 265.

NIKOLIC. — **Les succès du frein « Dozic » pour trains de marchandises.** (1 400 mots.)

1931 625 .17 = 91 .882

Saobracajni pregled, nº 7, p. 275.

KAREJSA. — **Entretien et réparations de la voie.** (Traduit du russe par MM. Milkovic et Zuravski). (3 000 mots & fig.) (A suivre.)

1931 625 .13 (.497.1) = 91 .882

Saobracajni pregled, nº 7, p. 283.

MARKOVIC. — Procédés nouveaux **pour l'aération des tunnels** (surtout en vue des conditions existant en Yougoslavie). (2 100 mots.)

In Czech.

(= 91.886)

Casopis pro železnični právo a politiku. (Praha.)

1931 625 .611 (.437) = 91 .886

Casopis pro zeleznicni právo a politiku, nº 6, p. 127.

KREJZA. — **La réglementation aux points de vues juridique et financier, des chemins de fer privés exploités par les Chemins de fer de l'Etat tchécoslovaque.** (3 400 mots.) (Fin.)

Zeleznični Revue. (Praha.)

1931 656 .254 = 91 .886

Zeleznicni Revue, nº 11, p. 163, nº 12, p. 179.

HOFFMANN. — **Avantages techniques et économiques de la commande centrale du mouvement** aux chemins de fer. (2 800 mots.)

1931 656 .25 = 91 .886

Zeleznicni Revue, nº 11, p. 163, nº 12, p. 177, nº 13, p. 193, nº 14, p. 213.

SVOBODA. — **Quelques questions de la science ayant pour but de garantir la sécurité de l'exploitation des chemins de fer.** (34 200 mots & fig.)

1931 656 .254 (.437) = 91 .886

Zeleznicni Revue, nº 14, p. 209.

NECHVATAL. — **Les installations téléphoniques pour le poste de direction centrale du mouvement des trains dans la banlieue de Prague.** (2 800 mots & fig.)

Zprávy železničnich inženýrů. (Praha.)

1931 385 .15 = 91 .886

Zprávy zeleznicnich inzenyru, nº 6, p. 130.

SCHMID. — **Chemins de fer d'Etat ou chemins de fer privés?** (Etude). (5 000 mots.)

1931 621 .133.30 = 91 .886

Zprávy zeleznicnich inzenyru, nº 6, p. 134.

ADLER. — **Isolement des chaudières de locomotives.** (2 200 mots.)

1931 625 .144.2 = 91 .886

Zprávy zeleznicnich inzenyru, nº 7, p. 143.

PELIXKA. — **Le surhaussement le plus économique du rail extérieur dans les courbes.** (6 000 mots & fig.)

1931 621 .131 : 1 = 91 .886 & 621 .43 = 91 .886

Zprávy zeleznicnich inzenyru, nº 7, p. 149.

KOREF. — **Les diagrammes du poids à remorquer par les automotrices avec moteur à explosion.** (2 700 mots & diagr.)

1931 625 .17 = 91 .886

Zprávy zeleznicnich inzenyru, nº 7, p. 154.

FLEISCHER. — **L'entretien de la voie dans des terrains percés de mines.** (2 000 mots & fig.)

11.333. — Publisher : M. Weissenbruch Co., Ltd., Printer to the King, 49, rue du Poinçon, Brussels.

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[016 .385 (02]

I. — BOOKS.

In French.

1931 651
BOLLE (G.).
La mécanisation du travail de bureau.
Paris, 6, rue de Messine. Un volume, 32 pages.

1931 669 .1
CROISSET (P.).
Etude sur le moulage de l'acier.
Paris (6e), Dunod, 92, rue Bonaparte. 1 volume (16 × 25), 206 pages et 75 figures. (Prix : 64 francs.)

1931 385 .581
PICAUD (R.).
Les conséquences de l'application de la loi de 8 heures dans les chemins de fer.
Lyon, Bosc Frères, M. et L. Rion. Un volume (16 × 25), 195 pages.

1931 621 .7
VARRIOT (E.).
Organisation des usines de chaudronnerie et de mécanique générale.
Paris (6e), Dunod, 92, rue Bonaparte. Un volume (13 × 21), 130 pages et tableaux. (Prix : 34 francs.)

In German.

1931 62. (01
DREYER (G.).
Erklärungen und Musterbeispiele zur Festigkeits- und Elastizitätslehre.
Leipzig, Dr. Max Jänecke. 1 Band, 179 Seiten. (Preis : 6.40 R.M.)

1931 62. (01 (.43), 625 .18 (.43) & 625 .27 (.43)
Güterprobensammlung.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 79 Seiten. (Preis : 18 R.M.)

1931 721 .9
Handbuch für Eisenbetonbau.
4. neubearbeitete Auflage, Band 11, Laufgang 3. (Bogen 13-18) in 4°.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. (Preis : 6.60 R.M.)

1931 665 .882 (.06
KEEL (C. F.) und REYMOND (G.).
Zehnter Internationaler Kongress für Acetylen, autogene Schweissung und verwandte Industrien. (Zürich, 9. bis 12. Juli 1930).
Basel, Schweizerischen Acetylen-Verein. 1 Band, 650 Seiten mit Abbildungen. (Preis : 30 Fr.)

1931 625 .3
MÜLLER (W.).
Bergbahnen und ihre Technik.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 49 Bl. mit Abbildungen. (Preis : 2.50 R.M.)

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Versuche mit Eisenbetonbalken zur Ermittlung der Widerstandsfähigkeit verschiedener Bewehrung gegen Schubkräfte.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 58 Seiten und 78 Abbildungen. (Preis : 11.40 R.M.)

1931 624 .2 & 721 .9
Versuche mit stahlbewehrten Balken.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band, 75 Seiten, 42 Textabbildungen und 41 zusammenstellungen. (Preis: 12 R.M.)

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1931 69 (.43)

DEUTSCHE REICHSBAHNGESELLSCHAFT.

Vorläufige Anweisung für Abdichtung von Ingenieurbauwerken (A. I. B.).

Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, rue des Paroissiens. 1 Band (in-4°), 59 Seiten, 16 Bl. (Preis : 3.60 R.M.)

In English.

1931 621

BILLINGS (J. H.).

Applied kinematics.

New York, Van Nostrand, D. & C°. 1 volume (6 × 9 inches), 173 pages & illustrations. (Price : $ 2.50.)

1931 625 .25 (02)

GLENN (C. O.).

Air brake inspector's handbook. (Second edition).

New York, Simmons-Boardman Publishing Company. 1 volume (5 × 7 inches), 328 pages, tables and illustrations. (Price : $ 3.50.)

1931 385. (08 (.66)

GOLD COAST RAILWAYS AND HARBOURS.

Administration reports for the year 1930-31.

Gold Coast, Sekondi, Railway Press. 1 volume, 97 pages, tables and figures.

1931 669 .1

GROSSMAN (M. A.) & BAIN (E. C.).

High-speed steel.

London, Chapman and Hall, Limited. 1 volume, 178 pages. (Price : 17 sh. 6 d.)

1931 625 .14 (.73)

HARVEY (A. F.).

Report on track practice on American and Canadian railways.

Calcutta. Government of India Central Publication Branch. 1 pamphlet, 23 pages. (Price : 1 sh.)

1931 624 .2

HAYDEN (A. G.)

The rigid-frame bridge.

New York, John Wiley and Sons; London, Chapman and Hall, Limited. 1 volume. (Price : 6 d.)

1931 385. (07 (.42)

LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE.

Programme of lectures and classes on railway and cognate subjects. Session 1931-32. Examination results, 1930-31.

London (W. C. 2), London School of Economics and Political Science, Houghton Street, Aldwych. 1 pamphlet, 30 pages.

1931 385. (07 (.42)

LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE.

Summary programme, Session 1931-32.

London (W. C. 2), Houghton Street, Aldwych. 1 pamphlet, 64 pages. (Price : 7 d.)

1931 51. (08

REDMOND (F. A.)

Tacheometric tables.

London (E. C. 4), Crosby, Lockwood and Son, Stationer's Hall Court. (Price : 8 sh. 6 d. net.)

1931 385 (091 (.42)

The main line railways of Great Britain, 1923-1930. A study by the Railway Research Service, based on official figures.

London (S. W. 1), The International Union of Railways, 4, Cowley-street.

[016 .385. (05]

II. — PERIODICALS.

In French.

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1931 385. (09.2 (.44)

Bull. de la Sté d'encouragement pour l'ind. nationale, juin, p. 369.

SAUVAGE (E.). — **Charles Fremont.** (4 800 mots.)

1931 621 .13 (06

Bull. de la Sté d'encouragement pour l'ind. nationale, juin, p. 404.

SAUVAGE (E.). — **Matériel présenté à l'Exposition internationale de Liége, en 1930, par la Compagnie des Chemins de fer de l'Est.** (2 700 mots.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1931 385 .6

Bull. de l'Union intern. des ch. de fer, juillet, p. 227.

Conventions et accords internationaux pour le transport par chemins de fer. — II. Accords internationaux pour l'échange du matériel roulant. (14 000 mots.)

1931 656

Bull. de l'Union intern. des ch. de fer, juillet, p. 242.

SHERRINGTON (C. E. R.). — **La situation de l'aviation civile et ses rapports avec les chemins de fer.** (7 500 mots & 8 tables.)

1931 621 .43 (.44)

Bull. de l'Union intern. des ch. de fer, juillet, p. 253.

Automotrices sur rail avec pneumatiques. (1 500 mots & fig.)

1931 **385 .113 (.4)**

Bull. de l'Union intern. des ch. de fer, juillet, p. 257.

Recettes et dépenses d'exploitation des chemins de fer européens. (Tableaux.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1931 **347.763.4 (.45)**

Bull. des transp. intern. par ch. de fer, septembre, p. 464.

Le régime légal des transports de marchandises par chemins de fer en Italie. (1 500 mots.)

1931 **313 .385 (.47.5)**

Bull. des transp. intern. par ch. de fer, septembre, p. 499.

Statistique des Chemins de fer lithuaniens de l'Etat pour l'exercice 1929. (900 mots.)

Chronique des transports. (Paris.)

1931 **656 .235.1 (.44)**

Chronique des transports, n° 17, 10 septembre, p. 5.

La question des **délais de transport.** (2 200 mots.)

Génie civil. (Paris.)

1931 **621 .392 (.44) & 625 .13 (.44)**

Génie Civil, n° 2559, 29 août, p. 213.

Renforcement, par soudure électrique, du pont sous rails, situé dans la station « Bastille » du Métropolitain de Paris. (2 300 mots & fig.)

1931 **624 .62 (.71)**

Génie Civil, n° 2559, 29 août, p. 219.

Le **pont-route métallique cantilever,** de 334 m. 35 d'ouverture, sur le Saint-Laurent, à Québec (Canada). (1 200 mots & fig.)

1931 **627 (.44) & 656 .213 (.44)**

Génie Civil, n° 2560, 5 septembre, p. 229.

PAWLOWSKI (A.) — Le **port** de Nantes et ses **transformations.** (8 600 mots & fig.)

1931 **691**

Génie Civil, n° 2560, 5 septembre, p. 242.

CHAPERIN (V.). — Le **kieselguhr** et son emploi comme **calorifuge.** (2 100 mots & fig.)

1931 **62. (01**

Génie Civil, n° 2561, 12 septembre, p. 258.

LOSSIER (H.). — **Influence de la forme sur la résistance des pieux flottants dans les terrains incompressibles ou décompressibles.** (1 500 mots & fig.)

1931 **621 .114**

Génie Civil, n° 2561, 12 septembre, p. 260.

Le Congrès du **graissage.** (Strasbourg, 20-26 juillet 1931. (4 000 mots.)

1931 **624 .63 (.41)**

Génie Civil, n° 2561, 12 septembre, p. 269.

Le **pont en béton armé** de Montrose, sur le South Esk (Ecosse). (700 mots & fig.)

1931 **625 .5 (.433)**

Génie Civil, n° 2562, 19 septembre, p. 277.

DUMAS (J.). — **Le chemin de fer à crémaillière et le funiculaire** de la Zugspitze. (Alpes bavaroises). (5 300 mots & fig.) (A suivre.)

1931 **385 .587**

Génie Civil, n° 2562, 19 septembre, p. 287.

LAMOUCHE (A.). — **L'organisation rationelle du travail.** Du problème technique au problème social. (2 300 mots.)

1931 **624 .63 (.460)**

Génie Civil, n° 2562, 19 septembre, p. 289.

RIBERA (J. E.). — Le **pont en béton armé** de Séville sur le Guadalquivir. (3 000 mots & fig.)

1931 **665 .882**

Génie Civil, n° 2562, 19 septembre, p. 292.

La **soudure autogène** et la métallographie. (2 200 mots.)

La Traction électrique. (Paris.)

1931 **621 .33 (.44)**

La Traction Electrique, juin, p. 149.

NASSE (J.). — Progression de **l'électrification** des lignes de la banlieue de Paris des chemins de fer de l'Etat. (2 700 mots & fig.)

1931 **621 .43**

La Traction Electrique, juin, p. 155.

LO BALBO (P.). — Un nouveau type **d'automotrices à accumulateurs** pour tramways et chemins de fer d'intérêt local. (1800 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1931 **656 .2 (.44)**

L'Ind. des voies ferrées et des transp. autom., août, p. 246.

COMMARTIN. — **Les moyens de transport par voie** ferrée destinés à assurer l'approvisionnement des Halles centrales à Paris. (4 100 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1931 **625 .4 (09 (.44)**

Revue générale des chemins de fer, septembre, p. 194.

GODFERNAUX (R.). — Le **chemin de fer métropolitain** de Paris. Son passé. Ses extensions futures. Son avenir. (15 000 mots & fig.)

1931 625 .245 (.44)
Revue générale des chemins de fer, septembre, p. 218.
Wagons autodéchargeurs de 100 m³ à bogies pour le transport de coke. (4 800 mots & fig.)

1931 656 .211.7
Revue générale des chemins de fer, septembre, p. 237.
Les **ferry-boats** et leur importance économique. (3 600 mots & fig.)

1931 625 .214
Revue générale des chemins de fer, septembre, p. 244.
Extension de l'emploi des **boîtes S. K. F. pour fusées d'essieux.** (2 500 mots & fig.)

Revue universelle des Mines. (Liége.)

1931 621 .116
Revue générale des mines, n° 5, 1er septembre, p. 117; n° 6, 15 septembre, p. 154.
JADOT (A. J.). — Note sur le calcul des **sollicitations d'une tuyauterie** parcourue par un fluide incompressible en régime permanent ou en régime varié. (7 200 mots & fig.) (A suivre.)

1931 621 .9
Revue universelle des mines, n° 6, 15 septembre, p. 160.
BRANDL (J.). — Une **foreuse** sensitive spéciale : La foreuse Hipple. (500 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1931 621 .132.3 (.43)
Die Lokomotive, August, S. 149.
HARDER (K. J.). — Die neuen 2 C 1 **Einheits-Schnellzugslokomotiven.** Reihe 03, der deutschen Reichsbahn. (900 Wörter & Abb.)

1931 621 .335 (.43)
Die Lokomotive, August, S. 151.
C 1 **Elektro - Verschublokomotive** der deutschen Reichsbahn. (600 Wörter & Abb.)

1931 385. (09 (.73) & 621 .13 (09 (.73)
Die Lokomotive, August, S. 152.
Die **Anfänge** der Pennsylvania Eisenbahn und ihre bemerkenswertesten Lokomotiven. (6 000 Wörter & Abb.)

1931 621 .33 (.44)
Die Lokomotive, August, S. 160.
Elektrischer Bahnbetrieb in Frankreich. (1 800 Wörter.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 621 .335 (.45)
Elektrotechnische Zeitschrift, Heft 35, 27. August, S. 1127.
Neue Gleichstromlokomotiven grosser Geschwindigkeit für 2 000 Gleichstrom. (2 800 Wörter & Abb.)

1931 621 .33 (.494)
Elektrotechnische Zeitschrift, Heft 37, 10. September, S. 1177.
Elektrisierung der Schweizerischen Bundesbahnen. (400 Wörter.)

1931 654. (06
Elektrotechnische Zeitschrift, Heft 38, 17. September, S. 1192.
Die 3. Tagung des Internationalen Beratenden Ausschusses für **Telegraphie** in Bern. (7 700 Wörter.)

Glasers Annalen. (Berlin.)

1931 621 .335
Glasers Annalen, Heft 4, 15. August, S. 37.
LANDMANN (K. W.). — Die **Akkumulator-Lokomotive** als Kleinlokomotive für Unterwegsbahnhöfe. (3 500 Wörter & Abb.)

1931 621 .43
Glasers Annalen, Heft 5, 1. September, S. 45.
LAUDAHN (W.). — **Schnellaufende Dieselmotoren.** (1 500 Wörter & Abb.) (Fortsetzung folgt.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1931 691 (.434)
Organ für die Fortschritte des Eisenbahnwesens, Heft 17, 1. September, S. 355.
SCHAECHTERLE (K.). — Das **Kieswerk** marstetten der Reichsbahndirektion Stuttgart in seinen wirtschaftlichen und wissenschaftlichen Auswirkungen. (5 000 Wörter & Abb.)

1931 625 .142.2
Organ für die Fortschritte des Eisenbahnwesens, Heft 17, 1. September, S. 364.
VAN DER PLOEG (J. AE.). — Ist das Doppel-Rüping-Verfahren für die **Tränkung von Buchenholz** genügend ? (1 000 Wörter & Abb.)

1931 656 .251 (.44)
Organ für die Fortschritte des Eisenbahnwesens, Heft 17, 1. September, S. 371.
WERNEKKE. — Das neue **Signalwesen** der französischen Eisenbahnen. (1 000 Wörter.)

Reichsbahn. (Berlin.)

1931 656 .286
Reichsbahn, Nr. 30, S. 694.
GOLTERMANN. — **Betriebsunfälle auf Bahnübergängen.** (5 Seiten.)

1931 656 .225
Reichsbahn, Nr. 31, S. 723.
TECKLENBURG. — Massnahmen zur **Beschleunigung der Stückgüterzüge** und Verbesserung der **Stückgutbeförderung.** (9 Seiten & Abb.)

1931 385. (072 (.43)
Reichsbahn, Nr. 32, S. 743.

KUEHNEL. — Ausbau und Arbeiten der **mechanischen Versuchsanstalt** des Reichsbahn-Zentralamts für Einkauf. (11 Seiten & Abb.)

Verkehrstechnische Woche. (Berlin.)

1931 625 .112
Verkehrstechnische Woche, Nr. 28, S. 371.

BARTSCH. — **Betriebsstudien auf Spurwechselbahnhöfen.** Die Arbeiten an der Rollwagengrube. (4 Seiten, Zeichn. & Diagr.)

1931 656 .224
Verkehrstechnische Woche, Nr. 29, S. 377; Nr. 30, S. 393.

JANISCH. — Die **Dampflokomotive im Personenzugdienst.** (11 Seiten & Diagr.)

1931 625 .245 & 656 .225
Verkehrstechnische Woche, Nr. 29, S. 383.

Fahrbare oder nichtfahrbare **Gross- und Kleinbehälter.** (2 Seiten & Diagr.)

1931 625 .162
Verkehrstechnische Woche, Nr. 30, S. 389.

CANTZ. — **Selbsttätige elektrische schrankenbeleuchtung** mit Signalwirkung durch Scheinwerfer. (4 Seiten & Abb.)

1931 625 .245
Verkehrstechnische Woche, Nr. 31, S. 401.

TECKLENBURG. — Ausnutzung der **Leig-Sonderwagen.** (2 Seiten.)

1931 621 .135. (01
Verkehrstechnische Woche, Nr. 31, S. 403.

SCHRAMM. — **Schwingungen** beim Durchfahren von **Ueberhöhungsrampen.** (4 Seiten mit Diagr.)

1931 385 (.43)
Verkehrstechnische Woche. Nr. 31, S. 407.

BORMANN. — **Die Investitionen der Deutschen Verkehrswirtschaft** nach der Inflation. (2 1/2 Seiten mit Diagr.)

1931 656 .212.5
Verkehrstechnische Woche, Nr. 32, S. 418.

MASCHKE. — Wechselnde **Abdrückgeschwindigkeiten beim Ablauf.** (4 Seiten & Diagr.)

1931 621 .392 & 625 .245
Verkehrstechnische Woche, Nr. 33, S. 426.

HORN. — **Geschweisste Grossraumgüterwagen.** (2 Seiten & Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 669
Zeitschr. Ver. deutsch. Ing. Nr. 35, 29. August, S. 1110.

LIEBREICH (E.). — **Korrosionsschutz von Metallen.** Oxydische Überzüge. (2 300 Wörter.)

1931 621 .43
Zeitschr. Ver. deutsch. Ing. Nr. 36, 5. September, S. 1123.

Der **Fahrzeugdieselmotor.** (3 000 Wörter & Abb.)

1931 385. (01 (.67)
Zeitschr. Ver. deutsch. Ing. Nr. 38, 19. September, S. 1203.

Die erste **transkontinentale Bahn** durch Mittel-Afrika. (600 Wörter.)

Zeitung des Vereins deutscher Eisenbahnverwaltungen. (Berlin.)

1931 385 .113 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 30, S. 821.

OTTO. — **Geschäftsbericht der Deutschen Reichsbahn-Gesellschaft** über das 5. Geschäftsjahr 1930. (2 1/2 Seiten.)

1931 625 .245 & 656 .225
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 30, S. 824.

HELLER. — Gedanken zum **Behälterverkehr.** (6 Seiten.)

1931 656 .253
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 31, S. 845.

BAESELER. — Die Frage der Übertragung bei der **Zugbeeinflussung.** (1 1/2 Seite.)

1931 656 .212.9
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 31, S. 847.

COUVE. — Die neuzeitliche **Eisenbahngüterabfertigung.** (12 1/2 Seiten, Zeichn. & Abb.)

1931 621 .33 (.42)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 31, S. 859.

Das **Elektrisierungsprogramm** für die englischen **Eisenbahnen.** (5 1/2 Seiten.)

1931 656 .223.2 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 32, S. 869.

BALLOF. — Die **Ausnutzung des Güterwagenparks** der Deutschen Reichsbahn im Jahre 1929. (8 1/2 Seiten & Diagr.)

1931 625 .111
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 33, S. 905.

HAUPT. — **Streckenpläne.** (5 Seiten & Zeichn.)

1931 651
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 33, S. 910.

ERNST. — **Wirtschaftlichkeit im Drucksachenverbrauch.** (1 1/2 Seite.)

1931 385 .63
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 34, S. 917.
LUEDICKE. — Das einheitliche Übereinkommen zwischen den Eisenbahn-verwaltungen über den **internationalen Eisenbahn-Güterverkehr.** (5 Seiten.)

1931 385 .113 (.43)
Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 35, S. 944.
TECKLENBURG. — Des **Wirtschaftsergebnis** der **Deutschen Reichsbahn** im Jahre 1930. (7 1/2 Seiten.)

In English.

Electric Railway Journal. (New York.)

1931 385 .15
Electric Railway Journal, No. 9, September, p. 448.
SPARGO (J.). — Government in business is disastrous business. (2 700 words & fig.)

1931 625 .26 (.73)
Electric Railway Journal, No. 9, September, p. 451.
LINDSEY (C. B.). — Modernized **maintenance facilities** effect improvement in **bus performance.** (2 400 words & fig.)

1931 656 .24 (06 (.73)
Electric Railway Journal, No. 9, September, p. 455.
Midwest Associations Convention at Denver. **Merchandising, employee relations, traffic** and **trolley buses.** (3 000 words & fig.)

1931 388
Electric Railway Journal, No. 9, September, p. 458.
GROSKIN (H.). — Who should pay for **high-speed transit** ? (4 600 words & fig.)

1931 621 .338 (.73)
Electric Railway Journal, No. 9, September, p. 462.
Indiana Railroad spends $ 980 000 for new **cars,** (1 000 words & fig.)

1931 621 .331 (.73)
Electric Railway Journal, No. 9, September, p. 467.
Kansas City reorganizes **distribution system.** (1 300 words & fig.)

1931 621 .33 (.73) & 625 .62 (.73)
Electric Railway Journal, No. 9, September, p. 469.
GUERNSEY (Ch.). — Broad field of use for the **trolley bus.** (1 800 words & fig.)

Engineer. (London.)

1931 621 .43
Engineer, No. 3946, 28 August, p. 217.
DURTNALL (W. P.). — The commercial fallacy of **« Diesel-electric » railway traction.** (300 words.)

1931 621 .31 (.42)
Engineer, No. 3946, 28 August, p. 218.
The Grampian **hydro-electric power scheme.** (2 000 words & fig.)

1931 621 .335 (.73) & 621 .43 (.73)
Engineer, No. 3946, 28 August, p. 220.
Oil-electric railway motor car. (300 words.)

1931 621 .31
Engineer, No. 3946, 28 August, p. 224.
Automatic **sub-stations.** (1 600 words.)

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193 1 621 .31
Engineer, No. 3946, 28 August, p. 226.
Metal-clad **switchgear.** (4 500 words & fig.)

1931 669 .1
The Metallurgist. Supplement to the Engineer, No. 3946, 28 August, p. 115.
The **alloys of iron, vanadium and carbon.** (1 800 words & fig.)

1931 669 .1
The Metallurgist. Supplement to the Engineer, No. 3946, 28 August, p. 117.
The **copper steels.** (2 400 words.)

1931 62. (01 & 669 .1
The Metallurgist. Supplement to the Engineer, No. 3946, 28 August, p. 123.
Nitride hardening of steel. (1 200 words.)

1931 62. (01 & 669 .1
The Metallurgist. Supplement to the Engineer. No. 3946. 28 August, p. 125.
The initial stages of **plastic strain in mild steel.** (2 000 words.)

1931 669 .1
The Metallurgist. Supplement to the Engineer, No. 3946. 28 August, p. 127.
Torsional fatigue of **welded steel.** (1 000 words.)

1931 385 .21 (.42)
Engineer, No. 3947, 4 September, p. 238.
GOOD (E. T.). — **Coal transport conditions.** (1 400 words.)

1931 621 .31 (.42)
Engineer, No. 3947, 4 September, p. 239.
The Grampian **hydro-electric power scheme.** (2 400 words & fig.)

1931 621 .39
Engineer, No. 3947, 4 September, p. 241.
Metal rectifier applications. (3 000 words & fig.)

1931 621 .43 (.42)
Engineer, No. 3947, 4 September, p. 243.
Pneumatic-tyred rail coaches (700 words & fig.)

1931 621 .6
Engineer, No. 3947, 4 September, p. 244.
Carrying a water main across a bascule bridge. (900 words & fig.)

1931 656 .1 & 656 .2
Engineer, No. 3947, 4 September, p. 251.
Railways and the public. (1 800 words.)

1931 621 .33 (.42)
Engineer, No. 3948, 11 September, p. 265.
WARREN (J. G. H.). — **Main line electrification.** (1 000 words.)

Engineering. (London.)

1931 621 .31 (.42)
Engineering, No. 3424, 28 August, p. 246, No. 3426, 11 September, p. 306.
ROBINSON (P. J.). — The Clarence Dock power station of the Liverpool Corporation. (6 900 words & fig.) (To be continued.)

1931 625 .4 (.73)
Engineering, No. 3424, 28 August, p. 250.
SKINNER (F. W.). — New York **electric subway construction** methods. — V. (1 600 words & fig.)

1931 621 .86
Engineering, No. 3424, 28 August, p. 254.
30 cwt. **overhead travelling crane** with 16 1/2 inches headroom. (700 words & fig.)

1931 621 .135.1 & 621 .135.4
Engineering, No. 3424, 28 August, p. 204.
TWINBERROW (J. D.). — The **breakage of the side frames of locomotives and of bogie trucks.** (2 400 words & fig.)

1931 621 .18
Engineering, No. 3424, 28 August, p. 267.
MARGUERRE. — **Experiences with high-pressure boiler plants.** (5 600 words & fig.)

1931 385 (.91 (.67
Engineering, No. 3424, 28 August, p. 271.
Railway developments in East Africa. (800 words.)

1931 621 .335 (.42)
Engineering, No. 3424, 28 August, p. 272.
Electric shunting locomotive for power station. (200 words & fig.)

1931 721 .2
Engineering, No. 3425, 4 September, p. 274
GRANT (R. J.). — The design of piled **retaining walls.** (2 500 words & fig.)

1931 621 .43 (.44)
Engineering, No. 3425, 4 September, p. 294.
Pneumatic tyres on railway vehicles. (700 words & fig.)

1931 621 .33
Engineering, No. 3426, 11 September, p. 301.
Regenerative braking on single-phase railways. (3 400 words & fig.)

1931 621 .6 (.73)
Engineering, No. 3426, 11 September, p. 307.
The Howden **turbovane induced-draught fan.** (1 700 words & fig.)

1931 064 (.42)
Engineering, No. 3426, 11 September, p. 317.
The shipping, engineering and machinery **exhibition** at Olympia. — I. (18 000 words & fig.)

1931 621 .133.1
Engineering, No. 3426, 11 September, p. 333.
The **testing of heavy-oil fuels.** (2 200 words.)

1931 721 .2
Engineering, No. 3426, 11 September, p. 335.
GRANT (R. J.). — The design of piled **retaining walls.** (3 000 words & fig.)

1931 62. (01 & 669 .1
Engineering, No. 3426, 11 September, p. 343.
COOK (G.). — The upper and lower **yield points** in **steel** exposed to non-uniform distributions of stress. (3 700 words & fig.)

Engineering News-Record. (New York.)

1931 614
Engineering News-Record, No. 9, 27 August, p. 326.
WATSON (F. R.). — **Noise reduction.** Its problems and prospects. (2 100 words.)

1931 721 .3
Engineering News-Record, No. 9, 27 August, p. 333.
SCHOLTEN (J. A.). — **Built-up wood columns** conserve lumber. (3 000 words & fig.)

1931 624 .63 (.73)
Engineering News-Record, No. 9, 27 August, p. 337.
Mc CULLOUGH (C.). — Design of a **concrete bowstring-arch bridge,** including analysis of theory. (2 200 words & fig.

1931
Engineering News-Record, No. 10, 3 September, p. 360.
Large **suburban terminal** built for Illinois Central Railroad. (2 100 words & fig.)

1931 625 .1 (.729)
Engineering News-Record, No. 10, 3 September, p. 366.
CLARKE (H. D.). — **First railway in Bermuda** nearing completion. (900 words & fig.)

1931 693
Engineering News-Record, No. 10, 3 September, p. 368.
POWERS (T. C.). — Constant consistency as an aid **to concrete control.** (3 500 words & fig.)

1931 624 .2
Engineering News-Record, No. 10, 3 September, p. 371.
HODGES (R. M.). — Deflection tests show rigidity of **steel rigid-frame bridges.** (1 000 words & fig.)

1931 621 .39 & 721 .9
Engineering News-Record, No. 10, 3 September, p. 374.
Welded joint carries column load of 380 tons in lobby alteration job. (2 200 words & fig.)

Institution of Engineers, Australia. (Sydney.)

1931 385 (.94) & 656 (.94)
Institution of Engineers, Australia, July, p. 255.
Institution of Civil Engineers, Australia. — **Chairman's address,** 23 March 1931 (**on railways and other** agencies of transport). (6 000 words.)

Mechanical Engineering. (New York.)

1931 62. (01 & 669
Mechanical Engineering, No. 9, September, p. 644.
JORDAN (L.). — **The wear of metals.** (6 500 words & fig.)

1931 385 .52 (.73)
Mechanical Engineering, No. 9, September, p. 651.
1930 **earnings of mechanical engineers.** (5 000 words & fig.)

1931 694
Mechanical Engineering, No. 9, September, p. 664.
BROUSE (D.). — Increasing the durability of **plywood.** (3 200 words & fig.)

1931 621 .18
Mechanical Engineering, No. 9, September, p. 677.
Data on the operation of **Loeffler boilers.** (4 800 words & fig.)

Modern Transport. (London.)

1931 385 .3 (.42) & 656 (.42)
Modern Transport, No. 650, 29 August, p. 2.
Transport and private bill **legislation.** (1 000 words.)

1931 656
Modern Transport, No. 650, 29 August, p. 3.
Air and rail co-ordination. Interview with Mr. J. R. More, General Manager, South African Railways. (1 700 words & fig.)

1931 313 .385
Modern Transport, No. 650, 29 August, p. 4.
A guide to **railway efficiency.** No. 1. — The value of **statistics.** (1 700 words.)

1931 656 .236 (.42)
Modern Transport, No. 650, 29 August, p. 5.
Railway carriage washing plant. (1 300 words & fig.)

1931 65
Modern Transport, No. 650, 29 August, p. 6.
Industrial traffic management. No. 5. — **Air freigh transport.** (900 words.)

1931 656 .225 (.43
Modern Transport, No. 650, 29 August, p. 7.
Light goods traffic to intermediate stations. (90 words & fig.)

1931 656 .1 (.73
Modern Transport, No. 650, 29 August, p. 8.
Co-ordination of rail and road. (400 words.)

1931 621 .33 (.42) & 621 .43 (.42
Modern Transport, No. 650, 29 August, p. 10.
LLOYD-JONES (L.). — **Railway electrification** (40 words.)

1931 621 .133.4 (.42)
Modern Transport, No. 650, 29 August, p. 11.
Spark arrester for steam wagons (Sentinel.) (300 words.)

1931 336 .2 (.42) & 656 (.42)
Modern Transport, No. 651, 5 September, p. 2.
Transport and taxation. (900 words.)

1931 621 .43 (.44)
Modern Transport, No. 651, 5 September, p. 3.
Pneumatic-tyred rail vehicle. (1 500 words & fig.)

1931 313 .385
Modern Transport, No. 651, 5 September, p. 5.
A guide to **railway efficiency.** No. 2. — Development of **statistics.** (1 600 words.)

1931 656 .223 .2
Modern Transport, No. 651, 5 September, p. 6.
Industrial traffic management. No. 6. — **Return of empty wagons.** (900 words.)

1931 656. (.68)
Modern Transport, No. 651, 5 September, p. 7.
Co-operation between rail and air. (1 500 words.)

1931 656 .211.7 (.43 + .489)
Modern Transport, No. 651, 5 September, p. 8.
An interesting **train-ferry.** (900 words.)

1931 38 (.45) & 656 (.45)
Moder Transport, No. 651, 5 September, p. 12.
Transport developments in Italy. (1 700 words.)

1931 621 .43 (.44)
Modern Transport, No. 652, 12 September, p. 1.
The pneumatic tyred rail vehicle. (300 words.)

1931 656 .28 (0 (.42)
Modern Transport, No. 652, 12 September, p. 3.
Railway accidents in Great Britain. (1 700 words.)

1931 313 .385
Modern Transport, No. 652, 12 September, p. 4.
A guide to railway efficiency. No. 3. — Essential figures for **testing operation.** (1 500 words.)

1931 656 .223.2
Modern Transport, No. 652, 12 September, p. 6.
Industrial traffic management. No. 7. — Private **owner's wagons.** (800 words.)

1931 621 .43 (.54)
Modern Transport, No. 652, 12 September, p. 7.
Shunting locomotive for India. (400 words & fig.)

Railway Age. (New York.)

1931 656 .1
Railway Age, No. 8, 22 August, p. 273.
How recover **lost freight traffic** ? (700 words.)

1931 656
Railway Age, No. 8, 22 August, p. 275.
Wider experiment with **freight containers.** (900 words.)

1931 625 .14 (.73)
Railway Age, No. 8, 22 August, p. 276.
Stronger **track** will cost less. Operating economy series. — Article No. 7. (4 900 words & fig.)

1931 621 .133.1 (.71) & 656 .22 (.71)
Railway Age, No. 8, 22 August, p. 280.
BLACK (R. A.). — **Operating methods affect fuel.** (2 000 words & fig.)

1931 625 .235
Railway Age. No. 8, 22 August, p. 283.
WOOLLEN (A. H.). — **Light-weight in car construction.** (2 500 words & 2 tables.)

1931 656 .23 (.73)
Railway Age, No. 8, 22 August, p. 287.
Shippers oppose **rate increase.** (5 700 words.)

1931 656 .1
Railway Age, No. 8, 22 August, p. 293.
How can railways **recover lost freight traffic** ? (3 700 words.)

1931 656 .1 (.73)
Railway Age, No. 8, 22 August, p. 296.
Union Pacific **bus operations** widespread. (1 800 words & fig.)

1931 621 .43 (.73) & 656 .212.6 (.73)
Railway Age, No. 9, 29 August, p. 314.
Railroads wise will motorize. Operating economy series. — Article No. 8. (6 300 words & fig.)

1931 656 .26 (.73)
Railway Age, No. 9, 29 August, p. 321.
Chesapeake & Ohio builds model **car shops** at Russell, Ky. (4 200 words & fig.)

1931 621 .43 (.73)
Railway Age, No. 9, 29 August, p. 327.
Lehigh Valley operates all **local service with rail cars.** (1 800 words & fig.)

1931 385 .52 (.73)
Railway Age, No. 9, 29 August, p. 329.
Railroads pay low **salaries.** (2 800 words & fig.)

1931 385 .1 (.73)
Railway Age, No. 9, 29 August, p. 328.
Government investment in railway bonds proposed. (1 600 words.)

1931 625 .162 (.73) & 656 .254 (.73)
Railway Age, No. 9, 29 August, p. 333.
Crossing protection signals on the Milwaukee. (2 100 words & fig.)

1931
Railway Age, No. 10, 5 September, p. 350.
Reducing **expenses at the enginehouse.** (3 200 words & fig.)

1931 621 .133.7 (.73) & 621 .136 (.73)
Railway Age, No. 10, 5 September, p. 354.
Speeding up trains with water cars. (2 100 words & fig.)

1931 656 .23
Railway Age, No. 10, 5 September, p. 357.
BECK (C. V.). — How **increase coal tonnage** ? (2 000 words.)

1931 656 .211 (.73) & 725 .31 (.73)
Railway Age, No. 10, 5 September, p. 359.
Oklahoma City opens **new station.** (3 700 words & fig.)

1931 385 .517 (.73)
Railway Age, No. 10, 5 September, p. 365.
Pacific electric sponsors **education among employees.** (1 500 words & fig.)

1931 621 .139 & 625 .27
Railway Age, No. 10, 5 September, p. 367.
CAVENAUGH (C. I.). — **Hidden costs of company material.** (2 500 words & fig.)

1931 625 .233 (.73)
Railway Age, No. 10, 5 September, p. 369.
Texrope **V-belt axle-generator drive.** (800 words & fig.)

1931 656 .1 (.73)
Railway Age, No. 10, 5 September, p. 371.
Substituting motor coaches for trains. (1 800 words & fig.)

Railway Gazette. (London.)

1931 385 .113 (.43)
Railway Gazette, No. 9, 28 August, p. 260.
German State Railway Company. Working results, 1930. (700 words.)

1931 621 .335 (.52) & 621 .43 (.52)
Railway Gazette, No. 9, 28 August, p. 264.
Diesel-electric shunting locomotive, Japanese State Railways. (600 words & fig.)

1931 625 .23 (.44)
Railway Gazette, No. 9, 28 August, p. 266.
Passenger rolling-stock for tropical countries. (1 300 words & fig.)

1931 385 .57 (.436)
Railway Gazette, No. 9, 28 August, p. 269.
Psychotechnical investigations in staff recruitment and allocation. (900 words.)

1931 621 .132.3 (54)
Railway Gazette, No. 9, 28 August, p. 270.
New branch line locomotives for India. (300 words & fig.)

1931 656 .1 (.42)
Railway Gazette, No. 9, 28 August, p. 273.
The Southern National Omnibus Co. Ltd. (2 100 words & fig.)

1931 347 .763 (41) & 656 .1 (.41)
Railway Gazette, No. 9, 28 August, p. 277.
Road traffic in Irish Free State. Summary of the New Bill. (800 words.)

1931 621 .133 .1 (.42)
Railway Gazette, No. 9, 28 August, p. 277.
A new fuel for internal-combustion-engines. (1 000 words.)

1931 656 .259
Railway Gazette, No. 10, 4 September, p. 292.
Runaway catch points. (800 words.)

1931 621 .335 (.42) & 621 .43 (.42)
Railway Gazette, No. 10, 4 September, p. 298.
Railway electrification. — An alternative proposal. (1 600 words.)

1931 385. (064 (.44)
Railway Gazette, No. 10, 4 September, p. 299.
French railway exhibits at the Paris Exhibition. (1 600 words.)

1931 385 .113 (.42)
Railway Gazette, No. 10, 4 September, p. 301.
Railway operating efficiency. (Great Britain, 1923-1930.) (1 500 words.)

193 1 625 .232 (.43)
Railway Gazette, No. 10, 4 September, p. 304.
New steel corridor coaches, German State Railway. (1 300 words & fig.)

1931 621 .132.1 (.42
Railway Gazette, No. 10, 4 September, p. 307.
Recent locomotive developments in France. (1 60 words.)

1931 621 .94 (.42
Railway Gazette, No. 10, 4 September, p. 308.
Machine tools for railway shops. (1 600 words & fig.

1931 656 .253 (.42
Railway Gazette, No. 10, 4 September, p. 316.
Completion of Great Western Railway automati train-control scheme. (400 words & fig.)

1931 656 .211 (.45) & 725 .31 (.45)
Railway Gazette, No. 11, 11 September, p. 324.
The new Central station at Milan. (800 words.)

1931 656 .28 (01 (.42)
Railway Gazette, No. 11, 11 September, p. 324.
Colonel Mount's annual report. (Railway accident in Great Britain). (800 words.)

1931 656 .211 (.45) & 725 .31 (.45)
Railway Gazette, No. 11, 11 September p. 331.
The new Central Station at Milan. (3 000 words & fig.)

1931 621 .335 (.83)
Railway Gazette, No. 11, 11 September, p. 336.
Electric locomotives for Chilean State Railways. (20 words & fig.)

1931 621 .132 .6 (.82)
Railway Gazette, No. 11, 11 September, p. 342.
New passenger tank locomotives, Buenos Ayres & Pacific Railway. (800 words & fig.)

In Bulgarian.

(= 91.881)

Spisanie (Sofia.)

1931 385 (.497 .2) = 91 .881
Spisanie, N° 1, p. 1; N° 2, p. 59.
IVANOV. — Quelques idées sur la situation économique de la Bulgarie du point de vue du trafic de chemin de fer. (6 000 mots.)

1931 625 .216 (.497 .2) = 91 .881
Spisanie, N° 1, p. 6.
RUSCEV. — Les nouveaux tampons employés pour le matériel roulant des chemins de fer de l'État bulgare. (2 000 mots & fig.) (A suivre.)

1931 656 .1 (.497 .2) = 91 .881
& 656 .2 (.497 .2) = 91 .881
Spisanie, N° 2, p. 54.
MARASLIEV. — Les transports par automobiles en Bulgarie au point de vue de leur concurrence aux Chemins de fer de l'État bulgare. (3 000 mots.)

In Spanish.

Gaceta de los Caminos de hierro. (Madrid.)

1931 — **625 .142.3**

Gaceta de los Caminos de hierro, N° 3663, 1 de Agosto, p. 241.

Traviesas metálicas huecas para **ferrocarril**. (1 500 palabras.)

1931 — **621 .132.8**

Gaceta de los Caminos de hierro, N° 3663, 1 de Agosto, p. 253.

Modificaciones verificadas en la **locomotora « Kitson-Still »**. (1 500 palabras.)

Ingenieria y Construcción (Madrid).

1931 — **621 .33 (.73)**

Ingenieria y Construcción, septiembre, p. 546.

KERR (Ch.). — Progresos de la **electrificación** de **ferrocarriles** en America. (2 700 palabras & fig.)

Los Transportes. (Madrid.)

1931 — **621 .33 (.460)**

Los Transportes, N° 311, 30 Agosto, p. 265.

Las **electrificaciones ferroviarias** españolas. (1 200 palabras & fig.) (Continuará.)

Revista de Obras Públicas. (Madrid.)

1931 — **62. (01 & 721 .9**

Revista de Obras Públicas, N° 17, 10 de Septiembre, p. 358; N° 18, 15 de Septiembre, p. 383.

CORDOBES (J. J. B.). — **Determinación del momento de inercia** de una sección circular maciza de hormigón armado. (1 800 palabras & fig.)

1931 — **624 .63 (.460)**

Revista de Obras Públicas, N° 18, 15 de septiembre, p. 372.

RIBERA (J. E.). — **Puente** de San Telmo, en Sevilla, sobre el Guadalquivir. (3 000 palabras & fig.)

1931 — **656 .284 (.460)**

Revista de Obras Públicas, N° 18, 15 de septiembre, p. 380.

MENDIZABAL (D.). — **Accidente** en el **viaducto** de Matarraña. (1 200 palabras & fig.)

In Italian.

L'Ingegnere. (Roma.)

1931 — **62. (01**

L'Ingegnere. Agosto. p. 528.

Nota applicativa **sul calcolo delle piastre sferiche**. (7 500 parole & fig.)

Notiziario tecnico. (Firenze.)

1931 — **621 .13 (06**

Notiziario tecnico, Settembre, p. 230.

Le **locomotive a vapore** all'Esposizione di Liegi. (4 800 parole & fig.)

1931 — **669**

Notiziario tecnico, Settembre, p. 240.

Alcune notizie sulla **lega « Silumin »**. (3 400 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 — **624 .32 (.492)**

De Ingenieur, N° 38, 18 September, p. 259.

HARMSEN (W. J. H.). — **Brug** voor gewoon verkeer over de Waal bij Zaltbommel. (3 000 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1931 — **621 .86 (.492)**

Spoor- en Tramwegen, N° 5, 1 September, p. 104.

POSTHUMUS (S.). — **Nieuwe 100-tons loopkraan** in de Centrale werkplaats te Tilburg. (2 400 woorden & fig.)

1931 — **625 .14. (01**

Spoor- en Tramwegen, N° 5, 1 September, p. 109.

DRIESSEN (Ch. H. J.). — De **berekening van den bovenbouw**. (2 000 woorden.)

1931 — **55 (.492) & 625 .122 (.492)**

Spoor- en Tramwegen, N° 5, 1 September, p. 112; N° 6, 15 September, p. 145.

JONGMANS (W. J.). — **Geologische onderzoekingen** voor de Nederlansche Spoorwegen in Limburg in verband met **bodemafschuivingen**. (2 300 woorden & fig.)

1931 — **621 .132.1 (.492)**

Spoor- en Tramwegen, N° 5, 1 September, p. 118.

LABRYN (P.). — Eenige nieuwe details bij de **nieuwere locomotieven** der Nederlandsche Spoorwegen. (1 400 woorden & fig.)

1931 — **625 .62 (.492)**

Spoor- en Tramwegen, N° 6, 15 September, p. 133.

FELIX (B. B. C.). — De **eenmanwagens** bij de Haagsche Tramweg Maatschappij. (3 300 woorden & fig.)

In Polish.

(= 91.885)

INŻYNIER KOLEJOWY. (Warszawa).

1931 — **621 .33 (.438) = 91 .885**

Inzynier Kolejowy, 1 Wrzesnia, str. 255.

PODOSKI (R.). — **Electrification** du centre ferroviaire de Varsovie. (4 200 mots, 5 tableaux & fig.)

1931 385 .524 = 91 .885

Inzynier Kolejowy, 1 Wrzesnia, str. 266.

KRZYZANOWSKI (W.). — Des **primes** sont-elles **nécessaires** pour les fonctionnaires supérieurs des chemins de fer et que doivent-elles être ? (3 000 mots.)

1931 625 .216 = 91 .885

Inzynier Kolejowy, 1 Wrzesnia, str. 268.

SZCZEPANSKI (W.). — **Attelage automatique** des wagons, système J. Floryanowicz. (1 500 mots.)

In Rumanian.

(= 599)

Revista C. F. R. (Bucuresti.)

1931 529 = 599

Revista C. F. R., Nos 7-8, p. 198.

PALTOR. — **La réforme du calendrier.** (10 800 mots & fig.)

In Serbian.

(= 91.882)

Saobračajni pregled. (Beograd.)

1931 621 .132.1 (.497.1) = 91 .882

Saobracajni pregled, N° 8, p. 316.

POPOVIC-GREPENAROVIC. — Les **nouvelles locomotives** des Chemins de fer de l'Etat yougoslave à voie normale. (5 000 mots.)

1931 625 .172 = 91 .882
& 625 .173 = 91 .882

Saobracajni pregled, N° 8, p. 321.

KAREJSA. — **Entretien et réparations de la voie.** (3 500 mots.) (A suivre.)

1931 625 .26 (.497.1) = 91 .882

Saobracajni pregled, N° 8, p. 325.

GREBENAROVIC. — L'atelier à Kraijevo pour la **réparation du matériel roulant** à voie normale. (10 000 mots.)

1931 625 .164 (.497.1) = 91 .882

Saobracajni pregled, N° 8, p. 339.

VANTUR. — **Lutte contre les entassements de neige** dans l'exploitation des chemins de fer yougoslaves. (5 500 mots & fig.)

In Czech.

(= 91.886)

Zelezniční Revue. (Praha.)

1931 656 .25 = 91 .886

Zeleznicni Revue, N° 15, p. 225; N° 16, p. 245; N° 17, p. 261.

SVOBODA. — Quelques questions de la science ayant pour but de garantir la **sécurité de l'exploitation des chemins de fer.** (7 000 mots et fig.)

1931 347 .763 (.43 + .436 + .437 + .494)
= 91 .886

Zeleznicni Revue, N° 16, p. 241; N° 17, p. 257.

ZAVISKA. — Les différences essentielles des **droits en matière de transports** de la Tchécoslovaquie, de l'Allemagne, de l'Autriche et de la Suisse. (5 800 mots.)

Zprávy železničnich inženýrů. (Praha)

1931 625 .144.2 = 91 .886

Zprávy zeleznicnich inzenyru, N° 8, p. 164.

PELINKA. — Le **surhaussement** le plus économique du rail extérieur dans les courbes. (6 000 mots.)

1931 621 .131 = 91 .886

Zprávy zeleznicnich inzenyru, N° 8, p. 170.

SLABYHOUD. — Le **pesage des locomotives.** (4 000 mots, fig. & diagr.)

11.469. — Publisher : M. Weissenbruch Co., Ltd., Printer to the King, 49, rue du Poinçon, Brussels.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

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(DECEMBER 1931)

[016 .385. (02]

I. — BOOKS.

In French.

1931 625 .2 & 625 .62

Annuaire (1931-32) de la Chambre syndicale des Fabricants et des Constructeurs de matériel pour chemins de fer et tramways.

Paris (8e), 7, rue de Madrid. Un volume, 666 pages. (Prix : 40 francs.)

1931 72. (02

ARNAUD (E.).

Cours d'architecture et de constructions civiles.

Paris (6e), Ch. Béranger, 15, rue des Saints-Pères et Liége, 1, quai de la Grande-Bretagne. Deux volumes (in-8°). Tome I : 606 pages et figures; Tome II : 755 pages et figures. 1 atlas (in-4°) de 236 planches en un carton. (Prix : 540 francs).

1931 691 & 721 .9

CHANSOU (M.).

Manuel de la construction en ciment et en ciment armé.

Paris (6e), J. B. Baillière et Fils, rue Hautefeuille, 19. Un volume in-18 (11 × 16), 424 pages, 338 figures. (Prix : 28 francs.)

1931 669 .1

COLLET (G.) & DIBOS (P.).

La fonte.

Paris, Baillière et Fils. Un volume, 406 pages et 172 figures. (Prix : 80 francs.)

1931 625 .4 (.44)

Le chemin de fer métropolitain de Paris.

Paris, Compagnie du chemin de fer métropolitain de Paris, 75, boulevard Haussmann. Un volume, (24.5 × 31.5), 58 pages.

1931 691. (02

MAGNEL (G.).

Pratique du calcul du béton armé.

Gand, Van Rysselberghe et Rombaut, 1, place d'Armes. Un volume, 304 pages, planches et figures. (Prix : 80 francs belges.)

1931 69. (02

MASSOTTE (E.).

Carnet des travaux publics et du bâtiment.

Paris et Liége, Librairie polytechnique, Ch. Béranger. Tome I, 507 pages, 78 tableaux, 2 planches et 380 figures. Tome II, 619 pages, 115 tableaux et 363 figures. (Prix : Tome I : 105 francs; Tome II : 120 francs.)

1931 313 .385 (.494)

Statistique des chemins de fer suisses pour 1929.

Berne, Département fédéral des chemins de fer. Un volume (22 × 25), 238 pages. (Prix : 5 francs suisses.)

In German.

1931 62. (01 & 669 .1

BUCHHOLTZ (H.). & SCHULZ (E. H.).

Zur Frage der Dauerfestigkeit des hochwertigen Baustahles St 52.

Berlin, Julius Springer. 2. Band, 6. Laufgang, 16 Seiten und 12 Abbildungen. (Preis : 1.60 R.M.)

1931 621. (02

LAUDIEN (K.).

Maschinenelemente.

Leipzig, Dr. Max Jänecke. 1 Band, 620 Seiten, 1 264 Abbildungen. (Preis : 19.80 R.M.)

1931 621 .137.1 (02

NORDMANN (H.).

Die Schule des Lokomotivführers. — Zweite Abteilung : Maschine und Fahrgestell. Lokomotivbauarten. Bremsen.

Berlin, Julius Springer. 1 Band, 546 Seiten, 409 Textabbildungen und 4 Tafeln. (Preis : 24.50 R.M.)

1931 625 .113

SCHRAMM (G.).

Der vollkommene Gleisbogen. Seine Gestaltung als Kurve mit stetigem Krümmungsverlauf.

Berlin, Julius Springer. 1 Band. (Preis : 6 R.M.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH in the number for November, 1897, of the *Bulletin of the International Railway Congress*, p 1509).

1931 621. (02
TEN BOSCH (M.).

Vorlesungen über Maschinenelemente. 5. Heft : Elemente der Kolbenmaschinen, Rohrleitungen.

Berlin, Julius Springer. 1. Band, 85 Seiten, 153 Abbildungen. (Preis : 7 R.M.)

In English.

1931 621 .43
ADAMS (O.).

Modern Diesel engine practice.

New York, Norman W. Henley Publishing Company, 2, West Forty-Fifth Street. 1 volume (6 × 9 inches), 650 pages. (Price : $ 6.)

1931 625 .113 & 625 .12
ALLEN (F.).

Railroad curves and earthwork.

New York, Mc Graw-Hill Book Company, 370, Seventh Avenue. 1 volume, (4 × 7 inches), 540 pages. (Price : $ 4.)

1931 62. (01 (06 (.73)
AMERICAN SOCIETY FOR TESTING MATERIALS.
Proceedings of the Thirty-third Annual Meeting. Vol. XXX. Part I : Committee Reports, Tentative Standards. Part II : Technical Papers.

Philadelphia, Office of the Society, 1315, Spruce Street; together 2 400 pages. (Price : Part I : $ 6.50; Part II : $ 6.)

1931 385. (02 (.73)
A yearbook of railroad information.

New York, Committee on Public Relations of the Eastern Railroads, 143, Liberty Street. 1 volume, 94 pages.

1931 38 (09
BOULTON (W. H.).

The pageant of transport throughout the ages.

London, Sampson Low, Marston & Co. Ltd. 1 volume (5 3/4 × 9 inches), 238 pages, 96 illustrations. (Price : 12 s. 6 d. net.)

1931 385. (08 (.52)
DEPARTMENT OF RAILWAYS, GOVERNMENT OF JAPAN.

Annual Report for the year ending 31 March 1930. English edition.

Tokyo, The Tokyo Tsukiji Type Foundry, Ltd. 1 volume, 270 pages, map, diagrams and figures.

1931 62. (06
HOWARTH (O. J. R.).

The British Association : I. — A retrospect, 1831-1931. II. — London and the advancement of science.

London, British Association for the Advancement of Science. 2 volumes, 330 and 321 pages.

1931 624 (.43)
MOHRINGER (K.).

The bridges of the Rhine.

London, W. C. 1., Karl Möhringer, 38, Bernard-Street. (Price : 25 sh.)

1931 62. (01
NADAI (A.).

Plasticity. Mechanics of the plastic state of matter.

New York and London : McGraw-Hill Book Co. — 1 volume (6 × 9 in.), 349 pages, illustrated. (Price : $ 2.50.)

1931 385. (08 (.91)
PALMER (A.).

Federated Malay States Railways' report for the year 1930.

Kuala Lumpur : Federated Malay States Government Printing Office. 1 volume, 72 pages, map and figures.

1931 621 .31
ROBBINS (J. E.).

Hydro-electric development in the British Empire.

Toronto, Macmillan Company of Canada Limited. 1 volume, 143 pages and maps. (Price in Canada : $ 1.25.)

1931 656. (06 (.73)
WHITEMAN (F. O.).

Proceedings, American Association of Railroad Superintendents.

St. Louis, Mo. Published by the Association, 1 017, Olive Street. 1 volume (6 × 9 inches), 414 pages.

In Italian.

1931 624 .2
SANTARELLA (L.).

Il comportamento elastico di ponti ferroviari in cemento armato. — Resistenza ed elasticità di calcestruzzi di cemento.

Milano, U. Hœpli. 2 volumi (in-8°), 64 e 48 pagine, 5 e 7 tavole. (Prèzzo di ciascuno volumi : 10 lire.)

[016 .385. (05]

II. — PERIODICALS.

In French.

Arts et Métiers. (Paris.)

1931 — 385. (01 (.67)

Arts et Métiers, septembre, p. 330.

PATY (G.). — **Moyens de pénétration** de l'Afrique équatoriale française. (7 800 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1931 — 62. (01

Bull. de la Soc. des ing. civ. de France, n^os 5 et 6, mai-juin, p. 682.

ANDROUIN (M.). — L'état actuel de la **normalisation industrielle.** (7 000 mots.)

Chronique des transports. (Paris.)

1931 — 656 .1 & 656 .2

Chronique des transports, n° 18, 25 septembre, p. 4.

Les transports combinés par chemin de fer et par automobile particulière. (3 200 mots.)

1931 — 385 .2 (.44)

Chronique des transports, n° 19, 10 octobre, p. 2.

Voies ferrées et voies d'eau. (1 300 mots.)

Ferrovia. (Bruxelles.)

1931 — 385

Ferrovia, octobre, p. 5.

La crise mondiale et son influence sur les **transports par chemin de fer.** (2 100 mots & fig.) (A suivre.)

Génie civil. (Paris.)

1931 — 656 .1 (.66)

Génie Civil, n° 2563, 26 septembre, p. 314.

THOMAS (J.). — **Les liaisons automobiles transsahariennes.** (3 000 mots & fig.)

1931 — 62. (01 & 621 .392

Génie Civil, n° 2564, 3 octobre, p. 345.

ROSENTHAL (D.). — La **résistance** et le calcul des **joints soudés** dans les pièces fléchies. (2 300 mots & fig.)

1931 — 625 .13 (.45)

Génie Civil, n° 2564, 3 octobre, p. 347.

Les **installations de ventilateurs** et **de pompes** sur les chantiers du tunnel de l'Apennin, sur la ligne de Bologne à Florence. (800 mots.)

1931 — 621 .9

Génie Civil, n° 2565, 10 octobre, p. 369.

Machines à usiner les surfaces gauches. (2 000 mots & fig.)

1931 — 656

Génie Civil, n° 2565, 10 octobre, p. 373.

L'organisation générale des moyens de transport. (1 600 mots.)

1931 — 656 .254

Génie Civil, n° 2566, 17 octobre, p. 392.

REY (Ph.). — **Dispositif d'annonce des trains** par les rails de la voie. (4 500 mots & fig.)

1931 — 62. (01 & 669 .1

Génie Civil, n° 2566, 17 octobre, p. 395.

SEIGLE (J.). — Nouveaux résultats sur la **trempe à l'eau des aciers doux,** notamment d'après une étude de M. Allan Bates. (3 200 mots & fig.)

1931 — 656 .1 (06

Génie Civil, n° 2566, 17 octobre, p. 398.

THOMAS (J.). — 1^er **Congrès international des autoroutes.** (Genève, 31 août-2 septembre 1931.) (3 500 mots & fig.)

1931 — 62. (01 & 691

Génie Civil, n° 2566, 17 octobre, p. 401.

VOLTERRA (E.). — La théorie mathématique de **l'élasticité** et les **bétons.** (900 mots.)

1931 — 625 .172

Génie Civil, n° 2566, 17 octobre, p. 403.

L'entretien des voies ferrées par le « soufflage mesuré » de gravillon sous les traverses. (800 mots.)

1931 — 621 .99

Génie Civil, n° 2566, 17 octobre, p. 404.

GREBEL (A.). — Les **boulons** à resserrage automatique. (800 mots.)

L'Equipement Rural. (Paris.)

1931 — 656 .1 & 656 .2

L'équipement rural, octobre, p. 6.

BÉRAUD (Ph.). — **Les automobiles sur rails** : « Les Michelines ». (4 200 mots.)

Les Chemins de fer et les Tramways. (Paris.)

1931 — 621 .132.8

Les Chemins de fer et les Tramways, septembre, p. 165.

Locomotives à vapeur articulées. (3 000 mots & fig.)

1931 — 621 .335 & 621 .43

Les Chemins de fer et les Tramways, septembre, p. 168.

Locomotive Diesel-électrique Baldwin. (4 500 mots & fig.)

1931 621 .43 (.44)
Les Chemins de fer et les Tramways, septembre, p. 171.
SPIES (E.). — **La « Micheline ».** Son intérêt dans l'exploitation ferroviaire. (4 500 mots & fig.)

1931 621 .332
Les Chemins de fer et les Tramways, septembre, p. 174.
L'alimentation en courant continu des réseaux de chemins de fer à faible trafic. (3 500 mots & fig.)

1931 625 .251
Les Chemins de fer et les Tramways, septembre, p. 176.
DUCHESNOY. — Application du **frein continu** au matériel petite vitesse. (2 700 mots & fig.)

1931 656 .211.5
Les Chemins de fer et les Tramways, septembre, p. 178.
DUCHESNOY. — **La modernisation des gares.** Emploi des **machines à enregistrer les bagages et à imprimer les billets.** (2 700 mots & fig.)

1931 621 .135.4 & 625 .215
Les Chemins de fer et les Tramways, septembre, p. 181.
Dispositif pour empêcher les **mouvements de lacet** des bogies. (900 mots & fig.)

1931 621 .132.3 (.437)
Les Chemins de fer et les Tramways, septembre, p. 182.
Locomotive-tender, type 1-4-2, des Chemins de fer de l'Etat tchécoslovaque. (2 000 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1931 621 .132.3 (.44)
Revue générale des chemins de fer, octobre, p. 269.
La **locomotive 241001 pour trains rapides lourds** (type 2-4-1) de la Compagnie des chemins de fer de l'Est. (4 000 mots & fig.)

1931 313 .385 (.44)
Revue générale des chemins de fer, octobre, p. 279.
Résultats obtenus en 1930 sur les réseaux des cinq compagnies principales des chemins de fer français. (Nord, Est, Orléans, Paris-Lyon-Méditerranée et Midi.) (Tableaux.)

1931 385 .113 (.64)
Revue générale des chemins de fer, octobre, p. 285.
Les **résultats d'exploitation** de la Compagnie des chemins de fer du Maroc pour l'exercice 1930. (2 800 mots.)

1931 385 .113 (.64)
Revue générale des chemins de fer, octobre, p. 288.
Les **résultats d'exploitation** de la Compagnie franco-espagnole du chemin de fer de Tanger à Fez pour l'exercice 1930. (2 800 mots.)

1931 621 .335 (.593) & 621 .43 (.593)
Revue générale des chemins de fer, octobre, p. 294
Locomotive Diesel-électrique Sulzer de 450 ch. de Chemins de fer du Royaume de Siam. (2 100 mots & fig.)

Revue universelle des Mines. (Liége.)

1931 621 .116
Revue universelle des mines, n° 8, 15 octobre, p. 235.
JADOT (A. J.). — Note sur le calcul des sollicitations d'une tuyauterie parcourue par un fluide incompressible en régime permanent ou en régime varié. (4 000 mots & fig.) (A suivre.)

1931 621 .392. (06
Revue universelle des mines, n° 8, 15 octobre, p. 247.
DUSTIN (H.). — **1er Congrès international pour la soudure des chaudières à vapeur,** La Haye, 1, 2, 3 juillet 1931. (3 300 mots.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1931 656. 232
Archiv für Eisenbahnwesen, Juli-August, S. 803.
MERKERT (E.). — Theoretische Abhandlung über die **Preisbildung im Verkehrswesen.** (11 500 Wörter, 2 Tabellen & Abb.) (Schluss folgt.)

1931 385 .113 (.493)
Archiv für Eisenbahnwesen, Juli-August, S. 829.
VON RENESSE. — **Die nationale Gesellschaft der belgischen Eisenbahnen im dritten Geschäftsjahr** (1. Januar bis 31. Dezember 1929), dargestellt auf Grund des Geschäftsberichts der Gesellschaft und des Berichts des Verwaltungsrats. — III. Betrieb und Verkehr. (9 500 Wörter.)

1931 385 (.438)
Archiv für Eisenbahnwesen, Juli-August, S. 871.
WYSZOMIRSKI. — **Einführung kaufmännischer Grundsätze bei den polnischen Staatsbahnen.** (6 000 Wörter.)

1931 385. (09 (.438)
Archiv für Eisenbahnwesen, Juli-August, S. 883.
Die polnischen Staatsbahnen Anfang 1931. (4 700 Wörter.)

1931 385 (.437)
Archiv für Eisenbahnwesen, Juli-August, S. 893.
HUSAK (A.). — **Die Neuordnung der Verhältnisse der tschechoslowakischen Staatsbahnen nach kaufmännischen Grundsätzen.** (10 500 Wörter.) (Schluss folgt.)

1931 385 .113 (.43)
Archiv für Eisenbahnwesen, Juli-August, S. 915.
BÜCHLER. — **Die Deutsche Reichsbahn im Geschäftsjahr 1929.** (14 000 Wörter.)

1931 385 .517.1 (.43) & 385 .517.2 (.43)
Archiv für Eisenbahnwesen, Juli-August, S. 963.
KUHATSCHECK (O.). — **Die Kranken- und Arbeiterpensionskassen, die Angestellten-, Unfall- und Arbeitslosenversicherung bei der Deutschen Reichsbahn im Jahr 1930.** (15 000 Wörter.) (Schluss folgt.)

1931 385. (01 (.69)
Archiv für Eisenbahnwesen, Juli-August, S. 999.
PASCHEN. — **Die Eisenbahnen von Madagascar.** (1 500 Wörter & Karte.)

1931 385 .113 (.67)
Archiv für Eisenbahnwesen, Juli-August, S. 1009.
DIECKMANN. — **Die Tanganyikabahnen.** (2 000 Wörter & Karte.)

1931 385 .113 (.675)
Archiv für Eisenbahnwesen, Juli-August, S. 1015.
DIECKMANN. — **Die Eisenbahnen vom unteren Congo nach Katanga.** (1 500 Wörter & Karte.)

Die Lokomotive. (Wien.)

1931 621 .132.4 (.497.2) & 621 .132.6 (.497.2)
Die Lokomotive, September, S. 169.
BRILING (G.). — **1-F-2 Heissdampf-Güterzug-Tenderlokomotive** der Bulgarischen Staatsbahn. (4 500 Wörter & Abb.)

1931 625 .253
Die Lokomotive, September, S. 176.
FORSSMANN (H.). — **Hildebrand-Knorr-Bremse. Eine neue Druckluftbremse.** (2 500 Wörter & Abb.)

1931 621 .133.1 (.43)
Die Lokomotive, September, S. 180.
Neue Erfahrungen mit der **Kohlenstaubfeuerung** der A.E.G. in Berlin. (500 Wörter & Abb.)

1931 625 .112 (.3)
Die Lokomotive, September, S. 184.
Die **häufigsten Spurweiten** der Eisenbahnen. (300 Wörter.)

Elektrische Bahnen. (Berlin.)

1931 621 .33 (.42)
Elektrische Bahnen, September, S. 263.
SCHMITT (H.). — Der Weir-Bericht über die **Elektrisierung** der englischen Eisenbahnen. (5 500 Wörter, 6 Tabellen & Abb.)

1931 621 .33 (.73)
Elektrische Bahnen, September, S. 285.
Die Entwicklung des elektrischen Zugbetriebs in den Vereinigten Staaten von Amerika 1930. (1 400 Wörter.)

Elektrotechnische Zeitschrift. (Berlin.)

1931 621 .335 (.44)
Elektrotechnische Zeitschrift, Heft 41, 8. Oktober, S. 1282.
Güterzuglokomotiven der Paris-Lyon-Mittelmeerbahn. (700 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1931 621 .43
Glasers Annalen, Heft 6, 15. September, S. 53; Heft 7, 1. Oktober, S. 61.
LAUDAHN (W.). — **Schnellaufende Dieselmotoren.** (4 300 Wörter & Abb.) (Fortsetzung folgt.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1931 625 .154
Organ für die Fortschritte des Eisenbahnwesens, Heft 18, 15. September, S. 373.
VON REUTENER. — **Neue Lokomotivdrehscheiben.** (8 000 Wörter & Abb.)

1931 625 .154
Organ für die Fortschritte des Eisenbahnwesens, Heft 18, 15. September, S. 384.
ROSENKRANZ (G.). — **Einbau von Drehscheiben** grösster Länge bei beschränkten Platzverhältnissen. (1 800 Wörter & Abb.)

1931 621 .135.4 & 625 .215
Organ für die Fortschritte des Eisenbahnwesens, Heft 19, 1. Oktober, S. 391.
Die Reibungszahl n° der **quergleitenden Bewegung rollender Räder** von Eisenbahnfahrzeugen. (10 300 Wörter, 8 Tafeln & Abb.)

1931 621 .13 (.497.2)
Organ für die Fortschritte des Eisenbahnwesens, Heft 20, 15. Oktober, S. 411.
OPITZ (R.). — **Die neuen Einheitslokomotiven** der Bulgarischen Staatsbahn. (4 600 Wörter & Abb.)

1931 625 .251
Organ für die Fortschritte des Eisenbahnwesens, Heft 20, 15. Oktober, S. 417.
GUNTHER (O.). — Die **Gegendruckbremse** der Dampflokomotive auf Steilbahnen. (1 400 Wörter & Abb.)

1931 625 .143
Organ für die Fortschritte des Eisenbahnwesens, Heft 20, 15. Oktober, S. 421.
LAUBOECK (D.). — Die **Schraubensicherung** im Eisenbahnoberbau. (1 900 Wörter & Abb.)

1931 625 .172
Organ für die Fortschritte des Eisenbahnwesens, Heft 20, 15. Oktober, S. 424.
SALLER. — **Abweichungen von der Spurweite.** (600 Wörter.)

Reichsbahn. (Berlin.)

1931 656 .211 (.43) & 388 (.43)
Reichsbahn, Nr. 35, S. 803.
MAY. — **Bahnsteigsperre und Grossstadtverkehr.** Arbeits- und Zeitstudien auf dem Hauptbahnhof Köln. (10 Seiten & Zeichn.)

1931 **385 .517 (.43)**
Reichsbahn, Nr. 35, S. 842.
VOLMER. — Die **Sozialversicherung** der Gepäckträger bei der Reichsbahn. (3 1/2 Seiten.)

1931 **656 .222.5**
Reichsbahn, Nr. 35, S. 856.
Die **Bedienung des Personenverkehrs** mit schnellfahrenden Zügen. (8 Seiten & Diagr.)

1931 **624 .1**
Reichsbahn, Nr. 35, S. 874.
GREGER. — **Fugen- und Stirnmauer-Abdichtungen bei Massivbrücken.** (6 Seiten & Zeichn.)

1931 **656 .23**
Reichsbahn, Nr. 35, S. 891.
MAYSENHÖLDER. — **Die Ermittlung der Betriebsleistungen.** (2 Seiten.)

Verkehrstechnische Woche. (Berlin.)

1931 **625 .245 (.43)**
Verkehrstechnische Woche, Nr. 24, S. 322.
SINGRUEN. — **Getreide-Grossgüterwagen** bei der Reichsbahn. (3 Seiten & Abb.)

1931 **656 .223.2 (.43)**
Verkehrstechnische Woche, Nr. 34, S. 442.
SCHROEDER. — Die **Verwendung** von **Grossgüterwagen** im Verkehr der Reichsbahn. (3 Seiten.)

1931 **656 .21 (01**
Verkehrstechnische Woche, Nr. 35, S. 450.
BLUM. — Anregungen zur **Gestaltung von Bahnhöfen.** (6 Seiten & Zeichn.)

1931 **656 .224**
Verkehrstechnische Woche, Nr. 35, S. 455.
JANISCH. — **Die Dampflokomotive im Personenzugdienst.** (2 Seiten & Diagr.)

1931 **656**
Verkehrstechnische Woche, Nr. 36-37, S. 463.
LEIBBRAND. — **Vorbedingungen für die Zusammenarbeit der Verkehrsmittel.** (3 1/2 Seiten.)

1931 **385 (.43)**
Verkehrstechnische Woche, Nr. 36-37, S. 467.
SARTER. — **Gedanken über die Zukunft unserer Eisenbahnen.** (3 1/2 Seiten.)

1931 **385. (09**
Verkehrstechnische Woche, Nr. 36-37, S. 471.
FRITZEN. — **Sind die Schienenbahnen überlebt ?** (6 1/2 Seiten & Diagr.)

1931 **656 .2**
Verkehrstechnische Woche, Nr. 36-37, S. 478.
LOHSE. — **Massnahmen zur Gesundung der Verkehrswirtschaft.** (3 Seiten.)

1931 **656 .1 & 656 .2**
Verkehrstechnische Woche, Nr. 36-37, S. 482.
RUDOLPHI. — **Hemmnisse und Möglichkeiten für eine volkswirtschaftlich gesunde Verkehrsteilung im Eisenbahn- und Kraftwagenpersonenverkehr.** (8 Seiten.)

1931 **656 .1 & 656 .2**
Verkehrstechnische Woche, Nr. 36-37, S. 490.
BECK. — **Eisenbahn- und Kraftwagenverkehr.** (9 Seiten.)

1931 **656**
Verkehrstechnische Woche, Nr. 36-37, S. 499.
WRONSKI. — **Die Zusammenarbeit des Flugzeuges mit den übrigen Verkehrsmitteln.** (5 Seiten.)

1931 **656**
Verkehrstechnische Woche, Nr. 36-37, S. 502.
BLUM. — **Das Tempo in der Entwicklung des Verkehrs und der Wirtschaft.** (1 1/2 Seite.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1931 **656 .222.1**
Zeitschr. des Ver. deutsch. Ing., Nr. 40, 3. Oktober. S. 1237.
NORDMANN (E. H.). — Massnahmen zur **Steigerung der Reisegeschwindigkeit** im Eisenbahnverkehr. (5 400 Wörter & Abb.)

1931 **621 .392 & 624 .9**
Zeitschr. des Ver. deutsch. Ing., Nr. 40, 3. Oktober, S. 1251.
KAYSER (H.) & HOPPE (C. J.). — **Über Profile der Stäbe geschweisster Fachwerkträger.** (3 300 Wörter, 3 Tafeln & Abb.)

1931 **624 .51 (.73)**
Zeitschr. des Ver. deutsch. Ing., Nr. 40, 3. Oktober, S. 1255.
BERNHARD (R.). — **Die erste Hudsonbrücke bei New-York mit 1.067 km weit gespannter Mittelöffnung.** (1 200 Wörter & Abb.)

1931 **621 .392 (.73)**
Zeitschr. des Ver. deutsch. Ing., Nr. 41, 10. Oktober, S. 1265.
LOTTMANN (H.). — Eindrücke auf dem Gebiete der **Schweisstechnik** aus den Vereinigten Staaten von Amerika. (3 500 Wörter & Abb.)

1931 **625 .253 (.436)**
Zeitschr. des Ver. deutsch. Ing., Nr. 42, 17. Oktober, S. 1298.
RIHOSEK (J.). — Versuche mit einer neuen **Druckluftbremse** in Österreich. (3 700 Wörter & Abb.)

Zeitung des Vereins deutscher Eisenbahnverwaltungen. (Berlin.)

1931 656 .2 & 725 .3

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 36, S. 966.

JUESGEN. — **Verkehrswerbung** durch **Mustergültige** Eisenbahnhochbauten. (4 Seiten & Abb.)

1931 656 .225

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 36. S. 969.

REFFLER. — **Das Problem der Stückgutbeförderung.** (4 1/2 Seiten.)

1931 347 .762 & 656 .23

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 37, S. 990.

HAUSTEIN. — **Tarif und Kontrahierungszwang der Eisenbahnen.** (9 Seiten.)

1931 621 .135.4 & 625 .215

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 37, S. 998.

BAESELER. — Der Einfluss der Spurweite und der Überhöhung in Gleiskrümmungen auf den **Lauf freier Lenkachsen.** (5 Seiten & Zeichn.)

1931 656 .212.8

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 37, S. 1003.

ABEND. — Die selbstdrückende **Schnellwaage.** (1 Seite & Zeichn.)

1931 385 .63

Zeitung des Vereins deutsch. Eisenbahnverw.. Nr. 37. S. 1004.

Bestimmungen des Vereins deutscher Eisenbahnverwaltungen über den internationalen Expressgutverkehr. (1 Seite.)

1931 625 .232 (.43)

Zeitung des Vereins deutsch. Eisenbahnverw., Nr. 38. S. 1019.

AACHEN. — Die neuen **Eilzug-Wagen** der Deutschen Reichsbahn-Gesellschaft. (1 Seite.)

In English.

Bulletin, American Railway Engineering Association. (Chicago.)

1931 385. (061.4

Bull. Amer. Ry. Eng. Assoc., July, p. 1.

Revisions and additions to the **manual of the American Railway Engineering Association.** (10-11 March 1931). (47 000 words & fig.)

Electric Railway Journal. (New York.)

1931 388

Electric Railway Journal, No. 10, 15 September, p. 497.

HANNA (J. H.). — **Evolution of community transportation.** (4 500 words & fig.)

1931 621 .338 (09 (.73) & 625 .62 (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 513.

MILLER (J. A.). — **Car design** reflects steadily rising standards of service. (4 000 words & fig.)

1931 621 .333 (09 (.73) & 621 .337 (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 519.

Continuous progress has characterized **motors and control.** (3 000 words & fig.)

1931 625 .25 (09 (.73) & 625 .215 (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 523.

BUCK (M.). — **Truck and brake history** shows **radical developments.** (2 800 words & fig.)

1931 388. (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 527.

Victory over political and engineering obstacles is **rapid transit** achievement. (4 000 words & fig.)

1931 625 .14 (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 533.

RYDER (E. M. T.). — Improvements in **track** have kept pace with the industry's needs. (4 500 words & fig.)

1931 621 .33 (.09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 537.

WITHINGTON (S.). — **Railroad electrification** of 4 500 miles. (3 200 words & fig.)

1931 621 .331. (09 (.73) & 621 .332. (09 (.73)

Electric Railway Journal, No. 10, 15 September, p. 543.

HARTE (Ch. R.). — **Power generation and distribution** have undergone many changes. (3 200 words & fig.)

1931 656 .1 & 621 .338

Electric Railway Journal, No. 10, 15 September, p. 551.

FAUST (C. A.). — A new vehicle with an interesting past : the **trolley bus.** (3 000 words & fig.)

Engineer. (London.)

1931 064 (.42)

Engineer, No. 3949, 18 September, p. 284; No. 3950, 25 September, p. 312.

SCOTT (L.). — **The Shipping, Engineering and Machinery Exhibition at Olympia.** (21 600 words & fig.) (To be continued.)

1931 669. (06 (.42)

Engineer, No. 3949, 18 September, p. 290; No. 3950, 25 September, p. 330; No. 3951, 2 October, p. 358.

The Institute of Metals. Annual autumn meeting held in Zurich from September 13th to 15th. (9 400 words.)

1931 621 .9

Engineer, No. 3949, 18 September, p. 292; No. 3951, 25 September, p. 340; No. 3952, 2 October, p. 368; No. 3953, 9 October, p. 398.

LANE (C.). — **Press-tool and fixture design.** (12 200 words & fig.) (To be continued.)

1931 385 .1 & 621 .33
Engineer. No. 3949, 18 September, p. 294.
Railway improvements .(1 100 words.)

1931 621 .13 (092
Engineer, No. 3949, 18 September, p. 298.
MILLER (R. N. A.). — Link in the history of the locomotive. George Stephenson's first experiment. (2 800 words & fig.)

1931 62. (01
Engineer, No. 3949, 18 September, p. 302.
A 1 000 000 lb. wire-rope testing machine. (1 700 words & fig.)

1931 621 .31
Engineer, No. 3949, 18 September, p. 304.
Four-winding transformers. (1 400 words & fig.)

1931 621 .43 (.729)
Engineer, No. 3950, 25 September, p. 320; No. 3951, 2 October, p. 359.
A petrol engine driven rail coach. (3 600 words & fig.)

1931 621 .3 (064 (.42)
Engineer, No. 3950, 25 September, p. 328.
The Faraday Exhibition. (3 200 words & fig.) (To be continued.)

1931 656 .253 (.42)
Engineer, No. 3950, 25 September, p. 332.
Automatic train control on the Southern Railway. (1 700 words & fig.)

1931 621 .39 & 669
The Metallurgist, Supplement to the Engineer, No. 3950, 25 September, p. 130.
Electric furnaces .(1 100 words.)

1931 669 .1
The Metallurgist, Supplement to the Engineer, No. 3950, 25 September, p. 131.
The ageing of hardened carbon steel. (1 200 words & fig.)

1931 669 .1
The Metallurgist, Supplement to the Engineer, No. 3950, 25 September, p. 132.
The wear and surface condition of cast iron. (1 700 words & fig.)

1931 669 .1
The Metallurgist, Supplement to the Engineer, No. 3950, 25 September, p. 134.
Nickel-chromium and iron-nickel chromium alloys. (1 700 words & fig.)

1931 385. (.44)
Engineer, No. 3951, 2 October, p. 341.
Railway organisation in France. (900 words.)

1931 669 .1 (06 (.42)
Engineer, No. 3951, 2 October, p. 346; No. 3952, 9 October, p. 369.
Iron and Steel Institute. Swansea meeting. (7 600 words.)

1931 62. (06 (.42)
Engineer, No. 3951, 2 October, p. 354; No. 3952, 9 October, p. 384.
The British Association centenary meeting. (9 900 words.) (To be continued.)

1931 62. (06 (.42) & 621
Engineer, No. 3951, 2 October, p. 356.
EWING (Sir A.). — Power. British Association, section G, Engineering. Presidential address, delivered 25 September 1931. (6 000 words.)

1931 62. (01
Engineer, No. 3952, 9 October, p. 381.
Non-destructive testing. (1 500 words.)

1931 621 .43 (.42)
Engineer, No. 3952, 9 October, p. 390.
An internal combustion shunting locomotive. (500 words.

1931 621 .33 & 621 .43
Engineer, No. 3953, 16 October, p. 402.
Railways and oil-electric locomotives. (1 000 words.)

1931 621 .43
Engineer, No. 3953, 16 October, p. 414.
DAVIES (S. J.). — A new type of high-speed heavy-oil engine. (3 600 words & fig.)

1931 656 .225
Engineer, No. 3953, 16 October, p. 417.
An interesting train load. (200 words & fig.)

1931 621 .33 (.485)
Engineer, No. 3953, 16 October, p. 417.
Electrification of the Stockholm-Malmö Railway and branch lines. (800 words.)

Engineering. (London.)

1931 62. (01 (.42) & 721 .9 (.42)
Engineering, No. 3427, 18 September, p. 348.
British investigations of steel structures. (5 600 words & fig.)

1931 621 .31
Engineering, No. 3427, 18 September, p. 354.
Modern high-capacity switchgear. (2 400 words & fig.)

1931 621 .94 (.73)
Engineering, No. 3427, 18 September, p. 357.
High-speed knee-type milling machines. (2 700 words & fig.)

1931 064 (.42)
Engineering, No. 3427, 18 September, p. 363.
The Shipping, Engineering and Machinery Exhibition at Olympia. — II. (16 500 words & fig.)

1931 625 .62
Engineering, No. 3427, 18 September, p. 380.
Regenerative operation on tramways. (2 100 words.)

1931 669. (06 (.42)
Engineering, No. 3427, 18 September, p. 381; No. 3428, 25 September, p. 396.
The Institute of Metals : Zurich meeting. (Twenty-third annual autumn meeting in Zurich on 13 September 1931. (13 900 words & fig.)

1931 62. (01 & 669 .1
Engineering, No. 3427, 18 September, p. 389.
HAIGH (B. P.) & ROBERTSON (T. S.). — **Plastic strain in relation to fatigue in mild steel.** (2 500 words, 5 tables & fig.)

1931 621 .39 & 669
Engineering, No. 3427, 18 September, p. 390.
KLONINGER (H. C.), KELLER (G.) & MEUCHE (H.). — **Electric furnaces** for the bright-annealing process. (3 600 words & fig.)

1931 69. (.73)
Engineering, No. 3428, 25 September, p. 399.
FLEMING (R.). **Fifty years of structural engineering** with special reference to the United States. (1 800 words & fig.)

1931 656 .1
Engineering, No. 3428, 25 September, p. 401.
Articulated **eight-wheel vehicles for heavy loads.** (2 700 words & fig.)

1931 064. (.42)
Engineering, No. 3428, 25 September, p. 404.
The **Shipping, Engineering and Machinery Exhibition** at Olympia. — III. (8 000 words & fig.)

1931 669
Engineering, No. 3428, 25 September, p. 418.
VON ZEERLEDER (A.). — Influence of variations in **heat-treatment and ageing on duralumin.** (2 000 words & fig.)

1931 62. (01 & 669 .1
Engineering, No. 3428, 25 September, p. 420.
FOWLER (Sir H.). — **Indentation hardness of test pieces resulting from plastic flow.** (2 000 words & fig.)

1931 62. (01
Engineering, No. 3428, 25 September, p. 421.
1 000 000 lb. **wire rope testing machine.** (2 600 words & fig.)

1931 621 .43 (.729)
Engineering, No. 3429, 2 October, p. 434; No. 3430, 9 October, p. 479.
Rail motor coaches for the Bermuda Railway. (2 400 words & fig.)

1931 62. (06 (.42) & 669
Engineering, No. 3429, 2 October, p. 440; No. 3430, 9 October, p. 469.
The **centenary meeting of the British Association.** (10 500 words.) (To be continued.)

1931 669 .1 (06 (.42)
Engineering, No. 3429, 2 October, p. 443; No. 3430, 9 October, p. 455; No. 3431, 16 October, p. 484.
The **Iron and Steel Institute** : Swansea meeting. (15 300 words.)

1931 62. (06 (.42) & 621
Engineering, No. 3429, 2 October, p. 444.
EWING (Sir J. A.). — **Power.** — Presidential address and Bramwell Trust lecture, delivered before section G of the British Association, London, on Friday, 25 September 1931. (6 000 words.)

1931 669 .1 (06 (.42)
Engineering, No. 3429, 2 October, p. 447.
BURNS (G.). — The **effect of molybdenum on medium-carbon steels** containing 1 to 2.5 per cent of manganese. (1 800 words & fig.)

1931 669 .1 (06 (.42)
Engineering, No. 3429, 2 October, p. 450.
HARRISON (R.). — The **influence of silicon on nickel steel.** (2 000 words, 1 table & fig.)

1931 621 .392 (.71) & 625 .143.3
Engineering, No. 3429, 2 October, p. 452.
The **electric welding of battered rail ends.** (1 000 words.)

1931 621 .335 (.460)
Engineering, No. 3430, 9 October, p. 473.
3 600-H.P. electric locomotive for Northern Railway of Spain. (400 words & fig.)

1931 62. (01 & 669 .1
Engineering, No. 3430, 9 October, p. 475.
The parkerizing and bonderizing **rust-proofing processes.** (1 400 words & fig.)

1931 669 .1 (06 (.42)
Engineering, No. 3430, 9 October, p. 475.
CUNNINGHAM (W. H.). — The surface hardening by nitrogen of **aluminium-chromium-molybdenum steels.** (3 600 words.)

1931 621 .94 (.42)
Engineering No. 3431, 16 October, p. 488.
33-inch combination **turret lathe** (2 000 words & fig.)

1931 621 .116
Engineering, No. 3431, 16 October, p. 508.
Double-seated **stop valve.** (4 500 words.)

Engineering News-Record. (New York.)

1931 621 .392 (.73) & 625 .13 (.73)
Engineering News-Record, No. 11, 10 September, p. 411.
KNOWLES (A. M.). — **Reinforcing main-line railway bridge by welding.** (1 000 words & fig.)

1931 614 .8 (.73) & 625 .162 (.73)
Engineering News-Record, No. 11, 10 September, p. 412.
Grade-crossing accident prevention. (500 words.)

1931 62. (01 (.73) & 621 .392 (.73)
Engineering News-Record, No. 12, 17 September, p. 436.
PRIEST (H. M.). — **Strength of structural welds.** (5 500 words & fig.)

1931 62. (01 & 721 .3
Engineering News-Record, No. 12, 17 September, p. 443.
Tests of concrete columns with solid metal cores. (400 words.)

1931 625 .111 (.73)
Engineering News-Record, No. 12, 17 September, p. 449.
BARTE (G. R.). — Track elevation for joint line and Union Station. (3 000 words & fig.)

1931 621 .87
Engineering News-Record, No. 12, 17 September, p. 454.
ROBIN (P. T.). — Determining clamshell bucket characteristics. (4 200 words & fig.)

1931 624 .7 (.73)
Engineering News-Record, No. 14, 1 October, p. 527.
THELIN (C. M.). — High-strength concrete used in New Fort Worth, Texas bridge. (800 words & fig.)

Institution of Engineers, Australia. (Sydney.)

1931 625 .4 (.944)
Institut. of Engineers, Australia, August, p. 287.
HUMPHRIES (A. H. D.). — Flat top and special tunnel construction. (1 400 words.)

1931 38. (.94)
Institut. of Engineers, Australia, August, p. 291.
PARKINSON (C. E.). — Transport in Australia (2 700 words.)

Journal, Permanent Way Institution. (London.)

1931 625 .143.3 (.43)
Journal, Perm. Way Inst., August, part II, p. 193.
ROBERTSON (V. A. M.). — Wear and tear of rails on London Underground Railways. (3 000 words.)

1931 625 .142
Journal, Perm. Way Inst., August, part II, p. 200.
BOWLER (F. T.). — Some methods of temporarily supporting the tracks during operations underneath. (3 700 words & fig.)

1931 621 .392
Journal, Perm. Way Inst., August, part II, p. 208.
GARDNER (E. P. S.). — Recent developments in the application of electric arc welding. (6 000 words & fig.)

1931 656 .281
Journal, Perm. Way Inst., August, part II, p. 223.
REDDING (W.). — Minor derailments. (2 800 words.)

London & North Eastern Railway Magazine.

1931 625 .144.4 (.42) & 625 .17 (.42)
L. & N. E. Railway Magazine, October, p. 504.
Labour-saving devices on the permanent way. (500 words & fig.)

Mechanical Engineering. (New York.)

1931 62. (01 & 669
Mechanical Engineering, October, p. 729.
ISENBURGER (H. R.). — Radiographic inspection of metals. (3 000 words & fig.)

1931 614 .8
Mechanical Engineering, October, p. 750.
Noise. (2 400 words.)

1931 621 .43
Mechanical Engineering, October, p. 758.
Railroad engineering. (800 words.)

1931 621 .131.1
Mechanical Engineering, October, p. 759.
On the calculation of the drawbar pull of steam locomotives. (100 words.)

Modern Transport. (London.)

1931 656 .214 (.42)
Modern Transport, No. 653, 19 September, p. 3.
Problem of joint lines. (1 600 words.)

1931 656 .253 (.42)
Modern Transport, No. 653, 19 September, p. 5.
A simplified method of automatic train control. (1 200 words & fig.)

1931 621 .132.5 (.54)
Modern Transport, No. 653, 19 September, p. 9.
British-built standard light goods locomotives for India. (900 words & fig.)

1931 656 .225
Modern Transport, No. 653, 19 September, p. 11.
Industrial traffic management. No. 8. — Packing of goods. (1 500 words.)

1931 621 .33
Modern Transport, No. 654, 26 September, p. 2.
Operation of electric trains. (1 000 words.)

1931 385. (091 (.729)
Modern Transport, No. 654, 26 September, p. 3.
Approaching completion of Bermuda Railway. (3 300 words & fig.)

1931 621
Modern Transport, No. 654, 26 September, p. 7.
EWINGS (Sir J. A.). — Development of power. Fifty years of progress. (2 700 words.)

1931 621 .13, 621 .33 & 621 .43
Modern Transport, No. 655, 3 October, p. 2.
Future of railway traction. (900 words.)

1931 621 .33 (.42)
Modern Transport, No. 655, 3 October, p. 3.
AGREW (W. A.). — Railway electrification. Present practice and possible developments. (3 600 words & fig.)

1931 — 621 .132.6 (.82)
Modern Transport, No. 655, 3 October, p. 5.
New tank locomotives for Argentina. (1 200 words & fig.)

1931 — 621 .43 (.41)
Modern Transport, No. 655, 3 October, p. 7.
Oil-engined rail car for Donegal Railways. (1 000 words & fig.)

1931 — 385 .113 (.52)
Modern Transport, No. 655, 3 October, p. 8.
Railways of Japan. (1 900 words & fig.)

1931 — 38 (.931)
Modern Transport, No. 656, 10 October, p. 2.
Transport in New Zealand. (1 100 words.)

1931 — 656 .253 (.42)
Modern Transport, No. 656, 10 October, p. 3.
Automatic train control. — « Strowger-Hudd » system on the Southern Railway. (1 000 words & fig.)

1931 — 625 .616
Modern Transport, No. 656, 10 October, p. 5.
Articulated locomotives with geared drive. (1 000 words & fig.)

1931 — 656 .227
Modern Transport, No. 656, 10 October, p. 6.
Industrial traffic management. — No. 9. **Conveyance of dangerous goods** by rail. (900 words.)

1931 — 656 .225 (.42)
Modern Transport, No. 656, 10 October, p. 8.
Road vehicles by rail. — Milk traffic for the Southern Railway. (1 000 words & fig.)

1931 — 656 .215
Modern Transport, No. 656, 10 October, p. 9.
Railway illumination. — Advantages of **flood lighting.** (1 200 words.)

1931 — 625 .245 & 656 .225
Modern Transport, No. 656, 10 October, p. 9.
Design of **containers.** — International competition awards. (300 words.)

1931 — 385 .1
Modern Transport, No. 656, 10 October, p. 10.
Railway problems of to-day. The financial aspect. (1 200 words.)

1931 — 656
Modern Transport, No. 656, 10 October, p. 10.
SHERRINTON (C. E. R.). — Practical railway **operating.** (800 words.)

1931 — 385 .2 (.06 (.42)
Modern Transport, No. 657, 17 October, p. 5.
The **Railway and Canal** Commission. Its origin and duties. (1 600 words.)

1931 — 624 .7 (.66)
Modern Transport, No. 657, 17 October, p. 7.
New **bridge** at Lagos, Nigeria. (800 words & fig.)

1931 — 656 .23
Modern Transport, No. 657, 17 October, p. 8.
Industrial traffic management. No. 10. — Minimum charges for short distances. (900 words.)

Proceeding, Institution of Mechanical Engineers. (London.)

1931 — 621 .43
Proceed. Institution of Mechanical Eng., January, vol. 120, p. 3.
DAVIES (S. J.). — An experimental investigation into induction conditions, distribution and turbulence in **petrol-engines** (Paper and discussion). (25 800 words, 8 tables & fig.)

1931 — 621 .134.3
Proceed. Institution of Mechanical Eng., January, vol. 120, p. 101.
GRESLEY (H. N.). — **High-pressure locomotives.** (Paper and discussion). (37 000 words, 2 tables & fig.)

1931 — 62. (01, 621 .135.3, 625 .13 & 669 .1
Proceed. Institution of Mechanical Eng., January, vol. 120, p. 301.
BATSON (R. G. C.) & BRADLEY (J.). — Fatigue strength of **carbon- and alloy-steel plates** as used for **laminated springs.** (Paper and discussion.) (9 000 words, 8 tables & fig.)

1931 — 621 .6
Proceed. Institution of Mechanical Eng., January, vol. 120, p. 337.
ALLEN (R. S.) & MILLINGTON (W. E. W.). — Modern methods of **raising water from underground sources.** (Paper and discussion.) (22 300 words & fig.)

Proceedings, American Society of Civil Engineers. (New York.)

1931 — 69
Proceed. Amer. Soc. Civil Eng., September, p. 1035.
HOPKINS (R.). — **Construction management.** (2 500 words.)

1931 — 624 .2
Proceed. Amer. Soc. Civil Eng., September, p. 1061.
SHEDD (T. C.), WILSON (D. M.) & FINDLEY (M. G.). — **Analysis of continuous frames** by distributing fixed-end moments. Discussion of paper by Hardy Cross. (3 600 words & fig.)

1931 — 625 .13 (.73)
Proceed. Amer. Soc. Civil Eng., September, p. 1101.
KEAYS (R. H.) & SULLIVAN (J. G.). — The eight-mile Cascade **Tunnel,** Great Northern Railway. (2 200 words.)

Railway Age. (New York.)

1931 **656 .255 (.73)**
Railway Age, No. 11, 12 September, p. 388.
Centralized traffic control reduces operating **costs.** (2 800 words & fig.)

1931 **625 .12 (.73) & 625 .13 (.73)**
Railway Age, No. 11, 12 September, p. 391.
Flat slab viaduct solves right-of-way problem. (3 500 words & fig.)

1931 **385 .3 (.73) & 656 .23 (.73)**
Railway Age, No. 11, 12 September, p. 395.
Carriers' rebuttal ends rate **hearings.** (4 500 words & fig.)

1931 **625 .234 (.73)**
Railway Age, No. 11, 12 September, p. 398.
Air conditioning with water as a refrigerant. (1 600 words & fig.)

1931 **385 .1 (.73) & 385 .3 (.73)**
Railway Age, No. 11, 12 September, p. 401.
Depreciation **accounting** prescribed by Interstate Commerce Commission. (3 200 words & fig.)

1931 **621 .338 (.73)**
Railway Age, No. 11, 12 September, p. 403.
Electric line installs high-speed **aluminium cars.** (1 700 words & fig.)

1931 **656 .212.6 (.73)**
Railway Age, No. 11, 12 September, p. 405.
Milwaukee uses **skids for handling** freight. (800 words & fig.)

1931 **625 .144.4 (.73) & 625 .17 (.73)**
Railway Age, No. 12, 19 September, p. 428.
Greater **use of machines in maintenance work** will produce greater economies. (5 000 words & fig.)

1931 **625 .18 (.73)**
Railway Age, No. 12, 19 September, p. 434.
What junior storekeepers say about **supply work.** (3 500 words & fig.)

1931 **625 .234 (.73)**
Railway Age, No. 12, 19 September, p. 437.
Katy operating **air-conditioned diners** on its « Texas special ». (2 600 words & fig.)

1931 **385 .113 (.73)**
Railway Age, No. 12, 19 September, p. 441.
SPERRY (H. M.). — **Charts of earning, investment and traffic** for two decades. (1 400 words & fig.)

1931 **621 .335 (.73)**
Railway Age, No. 12, 19 September, p. 443.
New Haven receives ten **electric locomotives.** (2 200 words & fig.)

1931 **385 .3 (.73) & 656 .29 (.73)**
Railway Age, No. 12, 19 September, p. 447.
Hearings on **railroad practices.** (3 900 words.)

1931 **656 .1**
Railway Age, No. 13, 26 September, p. 466.
Motor trucks reduce cost of freight service. (2 100 words & fig.)

1931 **625 .234 (.73)**
Railway Age, No. 13, 26 September, p. 469.
North Western tests unit **air-conditioning equipment.** (2 100 words & fig.)

1931 **725 .32 (.73)**
Railway Age, No. 13, 26 September, p. 471.
Notable **freight house** on air rights property (3 200 words & fig.)

1931 **385 .3 (.73) & 656 .23 (.73)**
Railway Age, No. 13, 26 September, p. 479.
Rate arguments before Interstate Commerce Commission. (5 600 words.)

1931 **385. (.73)**
Railway Age. No. 13, 26 September, p. 483.
Willard discusses **rates, wages, consolidation.** (1 500 words.)

1931 **656 .1 (.73)**
Railway Age, No. 13, 26 September, p. 485.
TALBOT (R. W.). — Why shippers use **trucks.** (5 000 words & 1 table.)

1931 **656 .1 (.73)**
Railway Age, No. 13, 26 September, p. 488.
Is « supplementary » **bus service** « **competitive** » ? (3 200 words & fig.)

1931 **385 .14 (.73)**
Railway Age, No. 14, 3 October, p. 501.
Effect of regulation on **railway stock prices.** (1 900 words.)

1931 **625 .144.4 & 625 .17**
Railway Age, No. 14, 3 October, p. 504.
Operating economy series (No. 13). — **Cutting costs on the repair track.** (2 200 words & fig.)

1931 **625 .12 (.73)**
Railway Age, No. 14, 3 October, p. 506.
50 miles of **double track** on embankment. (2 300 words & fig.)

1931 **651**
Railway Age. No. 14, 3 October, p. 508.
More economical **handling of stationery** on the Southern Pacific. (2 000 words & fig.)

1931 **621 .133.4 (.73)**
Railway Age, No. 14, 3 October, p. 513.
Illinois Central effects economies with improved **front end.** (2 100 words & fig.)

1931 385 .3 (.73)
Railway Age, No. 14, 3 October, p. 517.
Hearings on **railroad practices.** (5 600 words.)

1931 621 .134.3 (.73)
Railway Age, No. 14, 3 October, p. 521.
Multi-pressure 3-cylinder locomotive for New York Central lines. (300 words & fig.)

1931 385 .3 (.73) & 656 .23 (.73)
Railway Age, No. 14, 3 October, p. 523.
Rate arguments concluded. (4 400 words.)

Railway Engineer. (London.)

1931 385 .11 (.42)
Railway Engineer, October, p. 366.
Railway engineers and **reductions in expenditure.** (1 700 words.)

1931 621 .132.3 (.44) & 656 .222.1 (.44)
Railway Engineer, October, p. 367.
Locomotive performance. (900 words.)

1931 621 .33 (.42) & 621 .43 (.42)
Railway Engineer, October, p. 367.
Diesel-electric traction and home-produced fuel. (900 words.)

1931 656 .257 (.42)
Railway Engineer, October, p. 370.
The **operation of long-distance points by hand-generated power.** — I. (2 800 words & fig.) (To be continued.)

1931 62. (01 & 625 .143 (0
Railway Engineer, October, p. 374.
Testing strain in rails. (300 words.)

1931 625 .2 (01 & 625 .215
Railway Engineer, October, p. 375.
LIECHTY (H.). — **Improving the action of railway vehicles on curves.** (1 500 words & fig.)

1931 625 .1 (.42)
Railway Engineer, October, p. 378.
Widening of London Midland & Scottish **Railway main line** near Ambergate. (1 800 words & fig.)

1931 624 (.42)
Railway Engineer, October, p. 385.
WHITLEY (H. S. B.). — **Timber viaducts** in South Devon and Cornwall, Great Western Railway. (6 300 words & fig.)

1931 669
Railway Engineer, October, p. 393.
WILLIAMS (G.). — **Galvanised railway materials.** (3 000 words.)

1931 621 .132.3 (.44)
Railway Engineer, October, p. 395.
Rebuilt « **Pacific** » **locomotive,** Paris-Orleans Railway. (2 700 words & fig.)

1931 621 .133.1 (.42), 621 .33 (.42) & 621 .43 (.42)
Railway Engineer, October, p. 399.
MIALL (S.). — **Liquid fuel from coal.** (3 000 words.)

1931 621 .131.2
Railway Engineer, October, p. 401.
VINCENT (H. S.). — The « **Three-thirty » locomotive.** (900 words.)

Railway Engineering and Maintenance. (Chicago.)

1931 625 .144.4 (.73)
Railway Engineering and Maintenance, September, p. 790.
Machines speed rail laying on Boston & Maine. (4 200 words & fig.)

1931 656 .284 (.73)
Railway Engineering and Maintenance, September, p. 795.
A disastrous **bridge fire.** (1 800 words & fig.)

1931 625 .27 (.73)
Railway Engineering and Maintenance, September, p. 797.
TONKINSON (H. L.). — Accountant asks care in **reporting material.** (2 000 words & fig.)

1931 625 .143.1 (.73)
Railway Engineering and Maintenance, September, p. 799.
SKILLMAN (T. J.). — Pennsylvania adopts new **152-lb. rail section.** (1 000 words & fig.)

1931 614.8 (.73)
Railway Engineering and Maintenance, September, p. 802.
Using specific accidents to formulate rules. (2 100 words.)

1931 621 .133.7 (.73)
Railway Engineering and Maintenance, September, p. 805.
HOLMES (R. L.). — Sand trap clears water. (700 words & fig.)

1931 698. (.73)
Railway Engineering and Maintenance, October, p. 894.
Wholesale painting methods on the Pennsylvania Railroad. (3 000 words & fig.)

Railway Gazette. (London.)

1931 621 .33
Railway Gazette, No. 12, 18 September, p. 353.
Changing over from steam to electric traction. (1 000 words.)

1931 625 .253 (.944)
Railway Gazette, No. 12, 18 September, p. 361.
Brake trials on the New South Wales Government Railways. (1 500 words & fig.)

1931 656 .251 (.42)
Railway Gazette, No. 12, 18 September, p. 364.
Signal aspects, Metropolitan Railway. (2 000 words.)

1931 **669**
Railway Gazette, No. 12, 18 September, p. 367.
WATSON (G. S.). — Modern **non-ferrous foundry melting practice.** (2 000 words.)

1931 **625 .214**
Railway Gazette, No. 12, 18 September, p. 368.
The Isothermos **axlebox.** (1 400 words & fig.)

1931 **621 .132.5 (.54)**
Railway Gazette, No. 12, 18 September, p. 370.
New metre-gauge **2-8-2 freight locomotives,** Bombay, Baroda & Central India Railway. (1 300 words & fig.)

1931 **621 .9 (.42)**
Railway Gazette, No. 12, 18 September, p. 373.
Machine tools for railway workshops. (1 000 words.)

1931 **621 .332 (.45)**
Railway Gazette, No. 13, 25 September, p. 392.
Portable sub-stations on the Italian State Railways. (600 words & fig.)

1931 **385. (09.1 (.729)**
Railway Gazette, No. 13, 25 September, p. 393.
The **Bermuda Railway.** (1 600 words & fig.)

1931 **385. (01 (.6)**
Railway Gazette, No. 13, 25 September, p. 398.
Trans-saharan Railway. (600 words.)

1931 **621 .33 (.42)**
Railway Gazette, No. 14, 2 October, p. 420.
Clarifying the **electrification** issue. (1 000 words.)

1931 **656 .214 (.42)**
Railway Gazette, No. 14, 2 October, p. 420.
Joint lines. (700 words.)

1931 **656 .214 (.42)**
Railway Gazette, No. 142, October, p. 422.
MARSHALL (C. F. D.). — **Joint railways.** — An inconvenient survival. (1 500 words.)

1931 **621 .33 (.42) & 621 .43 (.42)**
Railway Gazette, No. 14, 2 October, p. 424.
Electrification and oil-electrification. (1 800 words.)

1931 **621 .33 (.42)**
Railway Gazette, No. 14, 2 October, p. 426.
Railway electrification. Mr. W. A. Agnew's presidential address to the Institution of Locomotive Engineers. (1 800 words.)

1931 **656 .225**
Railway Gazette, No. 14, 2 October, p. 428.
Steel containers for carrying bricks. (400 words & fig.)

1931 **656 .253 (.42)**
Railway Gazette, No. 14, 2 October, p. 429.
Resignalling York-Northallerton main line, London & North Eastern Railway. (700 words & fig.)

1931 **656 .253 (.42**
Railway Gazette, No. 14, 2 October, p. 432.
The Strowger-Hudd system of **automatic train control.** (2 500 words & fig.)

1931 **62. (01 & 669 .**
Railway Gazette, No. 14, 2 October, p. 436.
Metal protection processes. (700 words.)

1931 **621 .43 (.42**
Railway Gazette, No. 14, 2 October, p. 437.
Diesel rail car, Donegal Railways. (700 words & fig.

1931 **621 .335 (.460**
Railway Gazette, No. 14, 2 October, p. 441.
New **electric express locomotive** for Spain. (400 words & fig.)

1931 **621 .135.3 & 625 .213**
Railway Gazette, No. 14, 2 October, p. 441.
Improvements in the **strength of steel springs.** (300 words.)

1931 **621 .33 (.42) & 621 .43 (.42)**
Railway Gazette, No. 15, 9 October, p. 453.
Electrification versus Diesel-electric. (500 words.)

1931 **385 (.44) & 656 .1 (.44)**
Railway Gazette, No. 15, 9 October, p. 455.
« Marriage » **of rail and road.** (1 400 words.)

1931 **625 .144 (.42) & 625 .17 (.42)**
Railway Gazette, No. 15, 9 October, p. 460.
Permanent way maintenance with mechanical appliances. Recent developments in labour-saving devices in the North Eastern Area of the London & North Eastern Railway. (500 words.)

1931 **621 .43 (.41)**
Railway Gazette, No. 15, 9 October, p. 461.
New **motor trains,** Great Northern Railway (Ireland). (300 words & fig.)

1931 **625 .232 (.82)**
Railway Gazette, No. 15, 9 October, p. 463.
New **steel postal vans** for Argentine Railways. (1 400 words & fig.)

1931 **656 .225 (.42)**
Railway Gazette, No. 15, 9 October, p. 464.
Trucks for conveyance of road trailer milk tanks, Southern Railway. (700 words & fig.)

1931 **621 .133.1 (06 (.42)**
Railway Gazette, No. 15, 9 October, p. 475.
Oil from coal and the future of the coal industry. (1 600 words.)

1931 **625 .2 (0 (.42)**
Railway Gazette, No. 16, 16 October, p. 491.
Railway rolling-stock constructed in railway workshops and by contractors from 1928-30. (500 words.)

1931 621 .43 (.43)
Railway Gazette, No. 16, 16 October, p. 493.
Rail omnibuses on the German Railways. (800 words & fig.)

1931 656 .222.5 (06 (.4)
Railway Gazette, No. 16, 16 October, p. 495.
Inter-European time-table and through carriage conference. (2 800 words & fig.)

1931 625 .245 & 656 .225
Railway Gazette, No. 16, 16 October, p. 499.
International competition for the best type of container. (1 800 words & fig.)

1931 621 .132.3 (.44)
Railway Gazette, No. 16, 16 October, p. 501.
New Mountain type locomotive, French State Railways. (200 words & fig.)

1931 625 .244
Railway Gazette, No. 16, 16 October, p. 502.
The Flettner rotor cooling system for refrigerating vans. (500 words & fig.)

Railway Magazine. (London.)

1931 656 .222.1 (.42)
Railway Magazine, October, p. 246.
The fastest trains in Great Britain. (2 400 words.)

1931 656 .222.1 (.44)
Railway Magazine, October, p. 266.
Long non-stop runs in France. (2 000 words.)

Railway Mechanical Engineer. (New York.)

1931 621 .338 (.73)
Railway Mechanical Engineer, September, p. 437.
Electric line installs high-speed aluminium cars. (2 200 words & fig.)

1931 385 .52 (.73)
Railway Mechanical Engineer, September, p. 440.
American Society of Mechanical Engineers reports that the railroads pay low salaries. (3 000 words & fig.)

1931 621 .132.8
Railway Mechanical Engineer, September, p. 443.
WAGNER (R. P.). — Krupp-Zoelly turbine locomotive tested. (4 000 words & fig.)

1931 625 .236
Railway Mechanical Engineer, September, p. 449.
Cutting costs in the coach yard. (2 300 words & fig.)

1931 621 .132.5 (.71) & 621 .133.7 (.71)
Railway Mechanical Engineer, September, p. 451.
Freight locomotive designed for bad water territory. (3 000 words & fig.)

1931 625 .26 (.73)
Railway Mechanical Engineer, October, p. 479.
Illinois Central develops unit car cost system. (2 800 words & fig.)

1931 62. (01 & 669 .1
Railway Mechanical Engineer, October, p. 483.
BURBU (C. E.). New materials will cut locomotive repair costs. (5 000 words & fig.)

1931 621 .133.4 (.73)
Railway Mechanical Engineer, October, p. 488.
Illinois Central improves locomotive drafting. (2 000 words & fig.)

Railway Signaling. (Chicago.)

1931 625 .258 (.73) & 656 .254 (.73)
Railway Signaling, September, p. 299.
Car retarders installed in Stanley Yard. (3 300 words & fig.)

1931 656 .253 (.73)
Railway Signaling, September, p. 303.
Re-signaling of the Reading electrified territory. (5 600 words & fig.)

1931 656 .253 (.73)
Railway Signaling, September, p. 308.
Great Northern asks to remove train control. (700 words.)

1931 656 .257 (.73)
Railway Signaling, September, p. 309.
STAHL (L. R.). — Electric interlocking installed in Birmingham, Ala. (2 600 words & fig.)

1931 625 .175 (.73)
Railway Signaling, September, p. 312.
KNOWLES (C. R.). — Operating motor cars safely. (4 200 words & fig.)

1931 625 .162 (.73) & 656 .254 (.73)
Railway Signaling, September, p. 316.
Crossing protection signals on the Milwaukee Road. (2 500 words & fig.)

1931 656 .257 (.73)
Railway Signaling, October, p. 331.
ZANE (W. F.). — Chicago, Burlington & Quincy installs electric interlocking. (2 200 words & fig.)

1931 656 .257 (.73)
Railway Signaling, October, p. 335.
Chicago & Illinois Midland installs electric interlocking. (1 600 words & fig.)

1931 656 .253 (.73)
Railway Signaling, October, p. 337.
Chicago, St. Paul, Minneapolis & Omaha eliminates nearly 20 000 train stops annualy. (2 800 words & fig.)

1931 656 .257 (.73)
Railway Signaling, October, p. 342.
Power interlocking eliminates delays. (1 800 words & fig.)

1931 **656 .258 (.73)**
Railway Signaling, October, p. 345.
Remote control for interlocking saves $ 6 000 annually. (1 900 words & fig.)

1931 **385 .3 (.73) & 313 : 656 .25 (.73)**
Railway Signaling, October, p. 347.
Interstate Commerce Commission reports annual **signal statistics.** (7 000 words & fig.)

1931 **656 .257 (.73)**
Railway Signaling, October, p. 352.
California **specifications for automatic interlockers.** (1 100 words.)

South African Railways and Harbours Magazine. (Johannesburg.)

1931 **625 .26 (.68)**
South African Rys. & Harbours Mag., September, p. 1262.
South **African-built rolling stock.** (400 words & fig.)

1931 **621 .43 (.43)**
South African Rys. & Harbours Mag., September, p. 1364.
WITTE (F.). & STAMM (O.). — **Low-powered motor locomotives** in the service of the German State Railway Company. (4 000 words & fig.)

University of Illinois Bulletin. (Urbana.)

1931 **697**
University of Illinois Bulletin, No. 48, 28 July, p. 1
KRATZ (A. P.). — **Humidification for residences.** (6 800 words & fig.)

In Spanish.

Gaceta de los Caminos de hierro. (Madrid.)

1931 **669**
Gaceta de los Caminos de hierro, nº 3666, 15 de septiembre, p. 277.
Empleo de las **aleaciones de aluminio** en los ferrocarriles. (1 400 palabras.)

Ingenieria y Construcción (Madrid).

1931 **691**
Ingenieria y Construccion, octubre, p. 587.
BŒUF (A. P.).— **Elasticidad y resistencia de los hormigones.** (2 400 palabras.)

Revista de Obras Públicas. (Madrid.)

1931 **624 .63 (.460)**
Revista de Obras Publicas, nº 20, 15 de octubre, p. 413.
HUE (F.). — El **viaducto** de Teruel. (3 900 palabras.

In Italian.

Notiziario tecnico. (Firenze.)

1931 **656 .212**
Notiziario tecnico, Ottobre, p. 258.
La **tecnica delle manovre** nelle moderne stazioni d smistamento. (1 500 parole & fig.)

1931 **625 .2**
Notiziario tecnico, Ottobre, p. 260.
Impianti per **pulizia radicale delle carrozze.** (1 300 pa role & fig.)

Rivista tecnica delle ferrovie italiane (Roma.)

1931 **621 .33 (.45**
Rivista tecnica delle ferrovie ital. 15 settembre, p. 7
NISSIM. — **L'elettrificazione** della Nord-Milano (10 500 parole & fig.)

1931 **624 .6 (.45**
Rivista tecnica delle ferrovie ital. 15 settembre, p. 10
ORLANDINI (E.). — Due nuovi **viadotti** sulla linea Bari-Taranto sui valloni Palagianello e S. Stefano (3 500 parole & fig.)

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Rivista tecnica delle ferrovie ital. 15 settembre, p. 117
THESEIDER-DUPRE. — Le grandi **linee aeree per il trasporto dell' energia elettrica.** (13 300 parole, 21 quadri & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1931 **621 .39**
De Ingenieur, Nr 42, 16 October, p. 157.
HILPERT (A.). — Der heutige Stand der **Schweisstechnik.** (6 600 woorden & fig.)

1931 **624 .3**
De Ingenieur, Nr 42, 16 October, p. 273.
BIJLAARD (P. P.). — De **brug** over de Kali Progo ontworpen volgens een nieuw systeem. (8 400 woorden & fig.)

1931 **69**
De Ingenieur, Nr 42, 16 October, p. 291.
SWEYS (H.). — **Betonsamenstellingen.** (600 woorden.)

Spoor- en Tramwegen. (Utrecht.)

1931 **385. (09 (.493)**
Spoor- en Tramwegen, nr 7, 29 September, p. 164; nr 8, 13 October, p. 201.
TEN KLOOSTER (H. B.). — De **Belgische Spoorwegen.** (2 800 woorden & fig.)

1931 **624 .32 (.492)**
Spoor- en Tramwegen, nr 7, 29 September, p. 171.
DE BRUINE (J.). — **Viaduct over den Muiderstraatweg in de lijn Amsterdam-Hilversum.** (1 800 woorden & fig.)

1931 621 .43

Spoor- en Tramwegen, nr 7, 29 September, p. 173.

LABRIJN (P.). Ombouw der Bo-accumulatoren locomotieven nos 83 en 84 tot Diesel-electrische locomotieven. (1 800 woorden & fig.)

1931 625 .232 (.492)

Spoor- en Tramwegen, nr 8, 13 Oktober, p. 191.

BOLLEMAN KIJLSTRA (E.). — Nieuwe stalen postrijtuigen P 7011-7021 der Nederlandsche Spoorwegen. (700 woorden & fig.)

1931 656 .211 & 656 .254

Spoor- en Tramwegen, nr 8, 13 Oktober, p. 194.

SIMON-THOMAS (W.). — Een en ander omtrent het verband tusschen treindienstregeling en stationsaanleg. (1 800 woorden & fig.)

1931 621 .33 (.492)

Spoor- en Tramwegen, nr 8, 13 Oktober, p. 198.

VAN LESSEN (H. J.). — De elektrificatie van de lijnen Amsterdam-Alkmaar en Velsen-Uitgeest. (700 woorden & fig.) (Wordt vervolgd.)

In Polish.

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INŻYNIER KOLEJOWY. (Warszawa).

1931 621 .132.6 (.438) = 91 .885

Inzynier Kolejowy, 1 Pazdziernika, str. 277.

DOMANIEWSKI (St.). — Locomotive-tender type 1-3-1 des chemins de fer de l'Etat polonais. (4 200 mots & fig.)

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Inzynier Kolejowy, 1 Pazdziernika, str. 282.

OSSER (E.). — Longs parcours des locomotives. (3 200 mots, 2 tableaux & fig.)

1931 625 .254 = 91 .885

Inzynier Kolejowy, 1 Pazdziernika, str. 285.

JAHNS (A.). — Signal-avertisseur lumineux pour la protection des passages à niveau des chemins de fer. (1 200 mots & fig.)

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Inzynier Kolejowy, 1 Pazdziernika, str. 292.

Avantages pour lesquels les locomotives à moteur à combustion interne sont plus économiques dans le service de manœuvre que les locomotives à vapeur. (1 700 mots & fig.)

In Portuguese.

Boletim do Instituto de Engenharia (S. Paulo). (Brasil.)

1931 621 .332

Boletim do Instituto de Engenharia, Julho, p. 3.

CAMARGO (J. O. M.). — Linhas de transmissão. (2 300 palavras & fig.)

In Serbian.

(= 91.882)

Saobraćajni pregled. (Beograd.)

1931 656 .211.7 (.497.1) = 91 .882

Saobracajni pregled, n° 9, p. 361.

SENJANOVIC. — Transports par chemins de fer à destination et en provenance des ports de mer yougoslaves. (2 000 mots.)

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Saobracajni pregled, n° 9, p. 363.

JAKSEVAC-SCEGLOVITOV. —. L'efficacité des trains lourds de marchandises. (1 800 mots & fig.)

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Saobracajni pregled, n° 9, p. 383.

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Saobracajni pregled, n° 9, p. 402.

JOVICIC. — Le contrôle chimique de l'eau d'alimentation de locomotives et son épuration. (1 500 mots.)

In Czech.

(= 91.886)

Zelezniční Revue. (Praha.)

1931 385 .581 = 91 .886 & 656 .21 = 91 .886

Zeleznicni Revue, n° 18, p. 273.

HOFFMAN. — L'étude des durées du travail et de son rendement dans le service des gares. (2 000 mots.)

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Zeleznicni Revue, n° 18, p. 276.

SVOBODA. — Quelques questions de la science ayant pour but de garantir la sécurité de l'exploitation des chemins de fer. Répétition automatique des signaux sur la machine. Commande automatique des trains. (2 000 mots.) (A suivre.)

Zprávy železničnich inženýrů. (Praha.)

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Zpravy zeleznicnich inzenyru, n° 9, p. 179.

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1931 656 .222 = 91 .886

Zpravy zeleznicnich inzenyru, n° 9, p. 185.

SCHMID. — Les durées de parcours des trains. (3 000 mots & diagr.)

11.590. — Publisher : M. Weissenbruch Co., Ltd., Printer to the King, 49, rue du Poinçon, Brussels.

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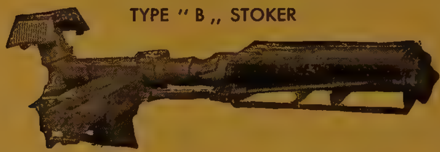

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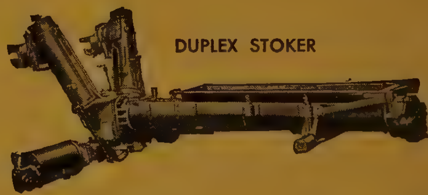

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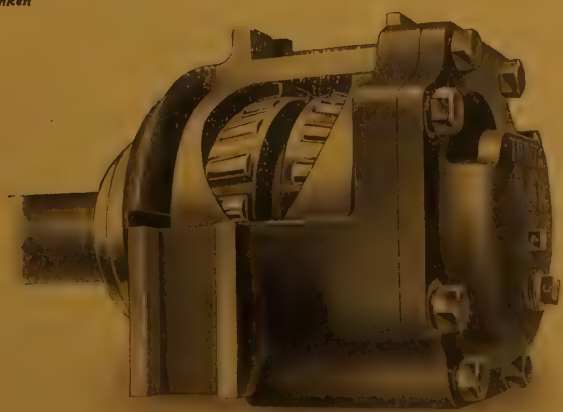

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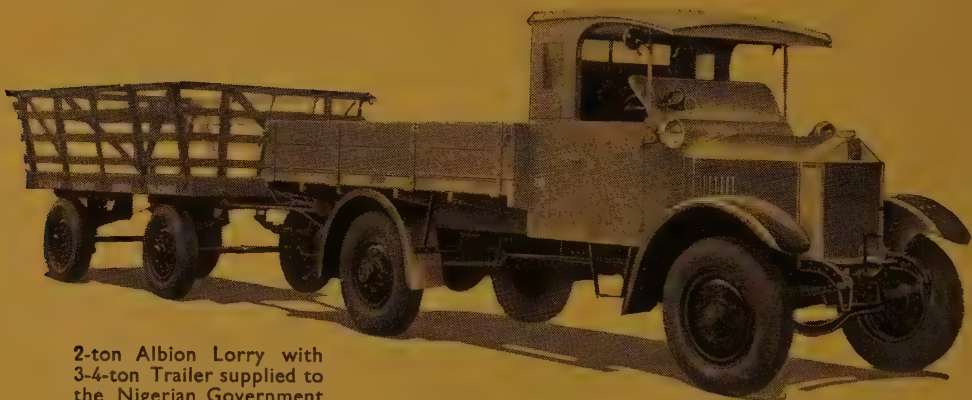

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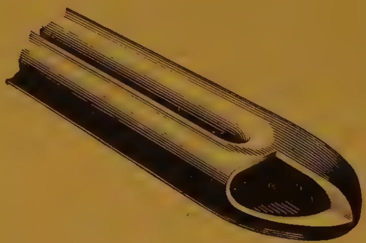

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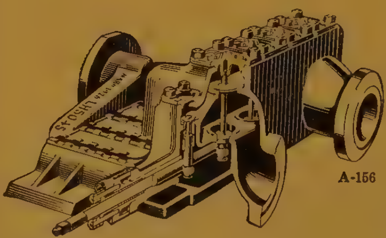

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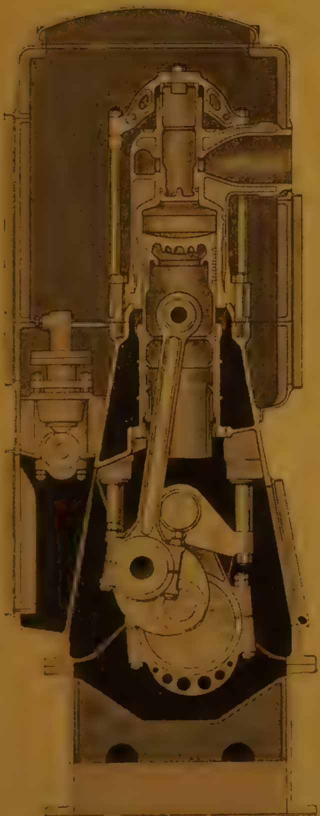

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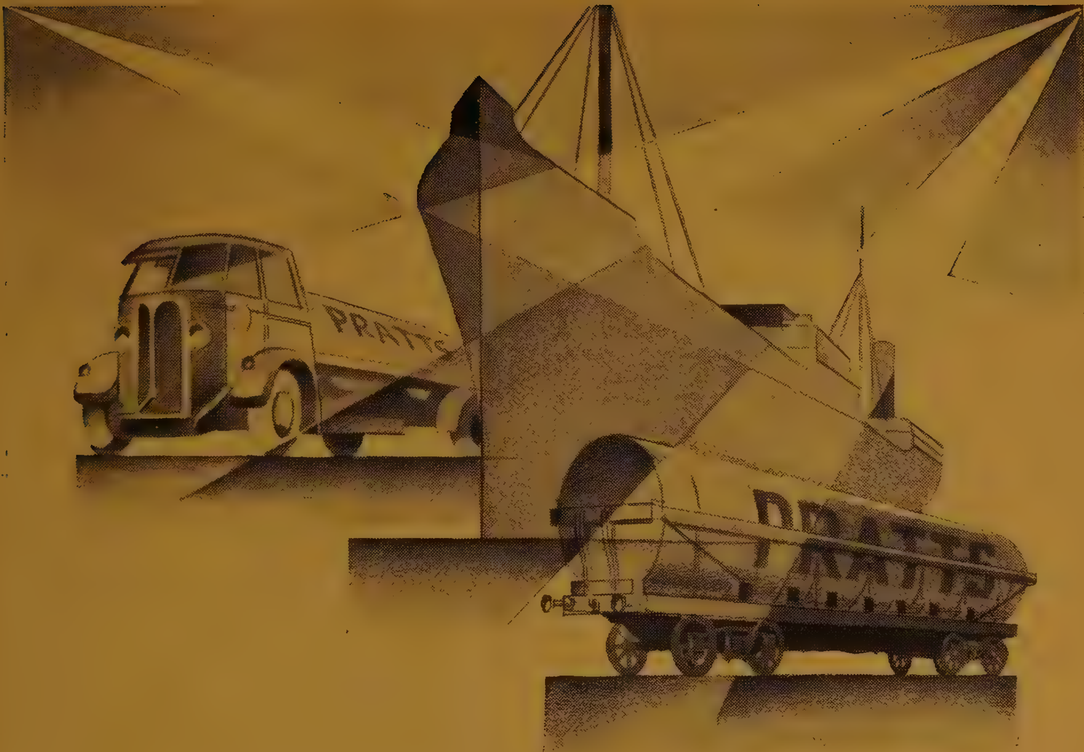

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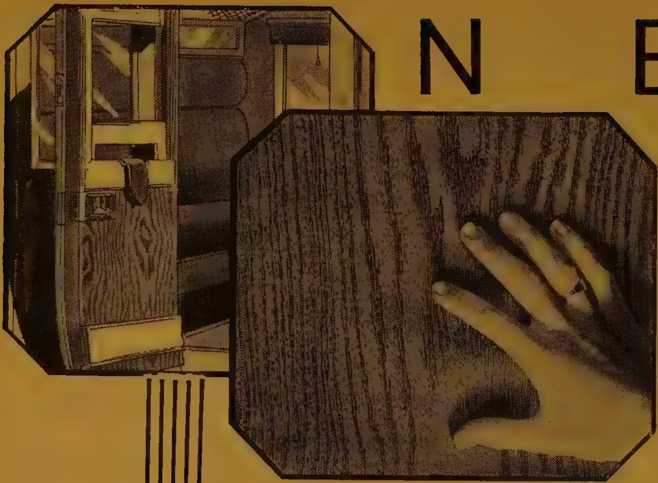

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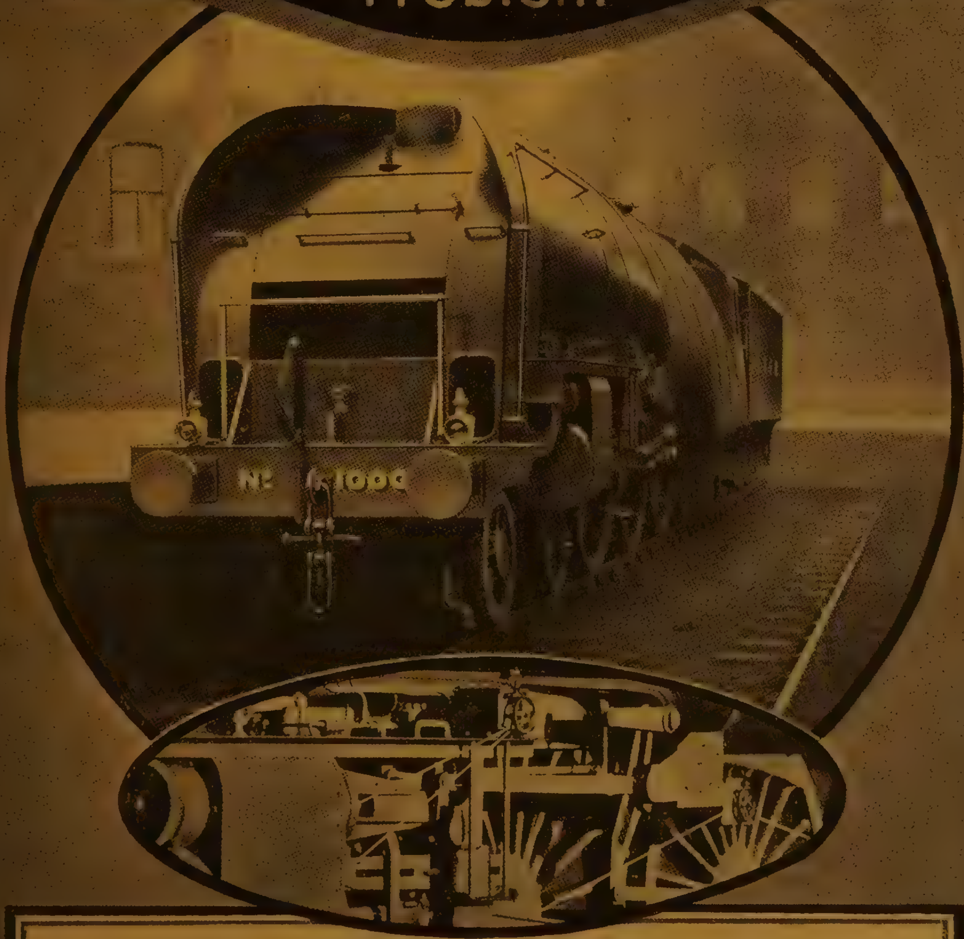

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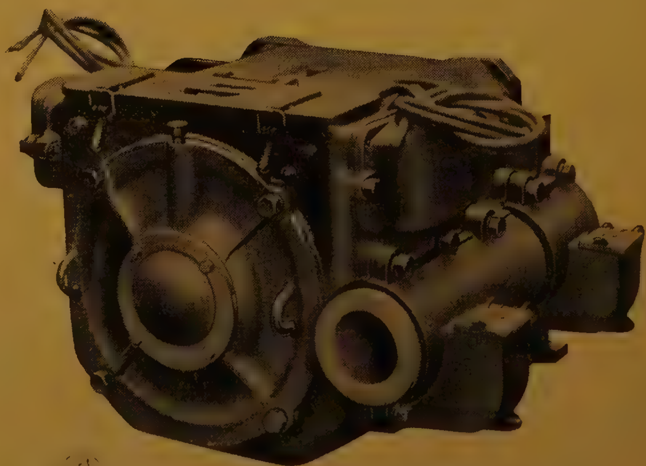

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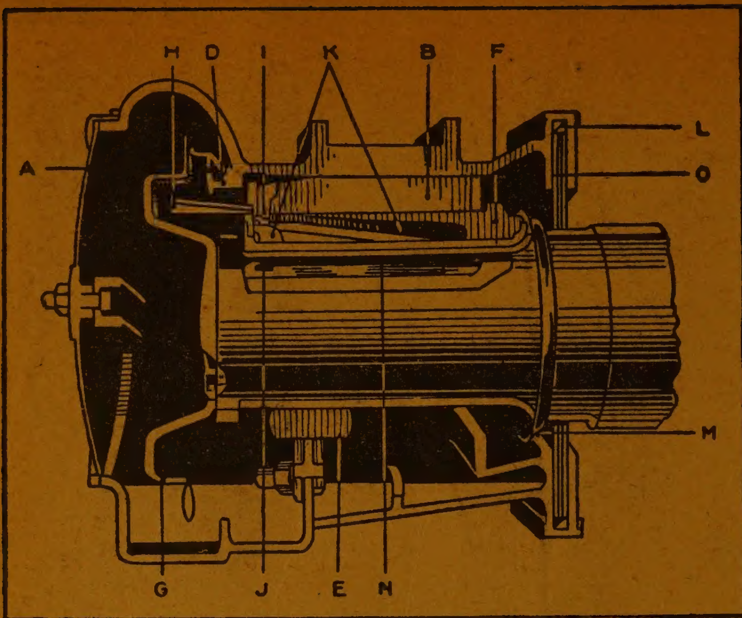

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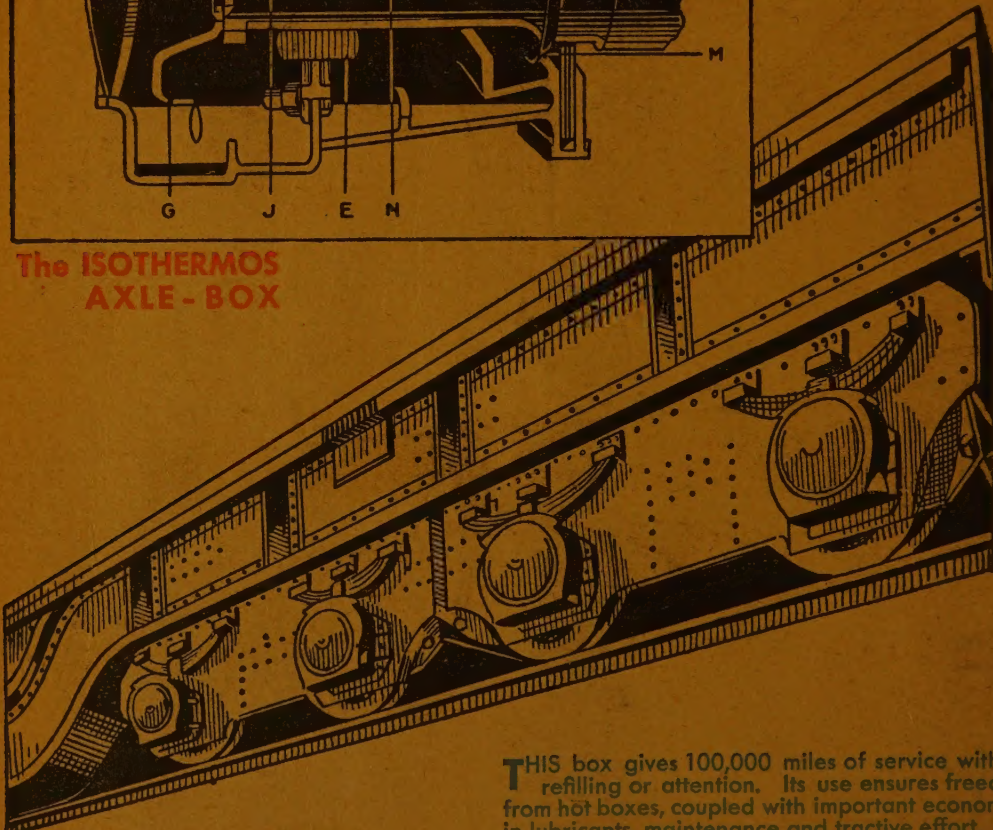

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